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CLINIC OF DR DEAN LEWIS

PRESBYTERIAN HOSPITAL

SEPARATION OF THE LOWER EPIPHYSIS OF THE FEMUR WITH ANTERIOR DISPLACEMENT AND T-FRACTURES

Summary. Two patients illustrating the mechanism of the production the characteristic deformity and the difficulties in the management of separation of the lower epiphysis of the femur one patient with T fracture of the lower end of the femur treatment by open operation effects of nails and screws in joint surfaces

TRAUMATIC separation of the lower epiphysis of the femur is usually due to hyperflexion or hyperextension of the knee joint. It is probably most frequently caused by torsion of the leg when the latter is extended. The 2 cases which I wish to show this morning in connection with the case about to be operated upon, illustrate well the mechanism of the fracture.

CASE I—This girl ten years of age gives the following history. In March, 1915, she fell from a vehicle while riding to school. Her heel was caught between the spokes of a revolving buggy wheel. She was thrown to the ground and dragged some 40 feet before she was freed from the wheel, when her shoe was torn off. She sustained at this time a separation of the lower epiphysis of the femur. An attempt at reduction was made at this time and immobilization was maintained for fifteen weeks. After removal of the immobilizing dressings the child had but little use of the leg. The displacement had not been reduced. In September, 1915 an open operation was performed to reduce the deformity, and immobilization was maintained for six weeks. This operation was not successful, as the motions at the knee-joint are limited, and the foot is turned inward to an angle of almost 45 degrees as a result of displacement, with torsion of the

epiphysis Flexion of the knee joint is limited to about 30 degrees by the lower end of the upper fragment which projects into the popliteal space and can be easily felt beneath the skin The x ray picture reveals the anterior displacement of the epiphysis and the projection into the popliteal space of the lower end of the upper fragment (Fig 408) In the anteroposterior view some idea of the rotation of the epiphysis is given No epiphyseal line is seen in the picture and judging from this it seems quite probable that the epiphyseal cartilage has become ossified (Fig 409)



Fig 408 —Case I Note displacement of epiphysis and projection of upper fragment into popliteal space

On June 27 1916 an operation was undertaken with the view of replacing the epiphysis and removing if necessary the fragment projecting into the popliteal space in order to increase the amount of flexion at the knee joint Correction of the displacement was rendered necessary in order to correct the torsion of the leg which caused an inward rotation of the foot to an angle of almost 45 degrees

Under ether anesthesia an incision measuring 4 inches in

length was made on the outer side of the thigh, extending upward from the line of the knee-joint. The incision was carried down to the bone, the lower end of the upper fragment and the displaced epiphysis being exposed. When the displaced epiphysis was exposed it was chiselled free from the shaft. It was impossible to replace this until the end of the fragment projecting into

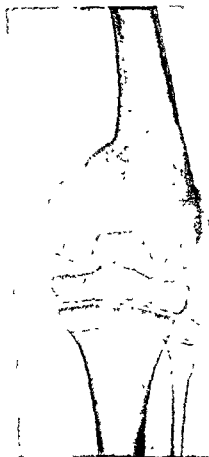


Fig. 409—Case I. Displacement and rotation of epiphysis well shown. Healing has occurred with obliteration of epiphyseal line.

the popliteal space was resected. When this was removed and the knee partially flexed the displaced fragment could be slipped back into position. A small Lane plate was employed to maintain fixation of the epiphysis with the shaft. A plaster-of-Paris cast was applied after the incision was closed, the knee-joint being slightly flexed. Immobilization was maintained for six weeks.



Fig 410

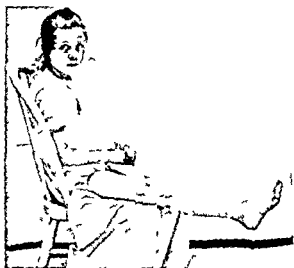


Fig 411

Figs 410 and 411 —Case I Range of motion obtained after open operation

It is now thirteen months since this patient was operated upon. She has good use of the knee-joint. Flexion to about 85 degrees is present (Fig. 410), and the knee can be almost completely extended (Fig. 411), and the displacement of the foot due to rotation of the epiphyseal fragment has been corrected. There is a shortening of $1\frac{1}{4}$ inches, which necessitates a high sole and heel. The lower epiphysis takes a very active part in the growth



Fig. 412

Fig. 413.

Figs. 412 and 413—Case I. Roentgenogram after operation. (Compare with Figs. 408 and 409.)

of the femur, and I am afraid that the shortening will increase as the child grows, as the x-ray examination would seem to indicate that the epiphyseal cartilage has undergone ossification (Figs. 408 and 412). The function of the extremity has been greatly benefited by the operation, for the gait is practically normal. It is impossible to estimate how much shorter the extremity will become as the child grows. The epiphyseal line is obliterated, and it is more than likely that all growth at that line has ceased.

CASE II —This boy thirteen years of age was injured on the 28th of July 1916. The seat of the buggy in which he was riding was narrow, and he was crowded off of it and fell between the body of the buggy and the wheel. His right leg was caught between the spokes. The horse was stopped almost at once and the boy's foot released. The leg could not be straightened out and severe pain was experienced about the knee joint.

When examined twelve days after the accident the right leg



F 414 —Case II. Roentgenogram showing separation of epiphyses. Notice projection of upper fragment into popliteal space.

was found to be held in partial flexion. Attempts which were made to straighten it caused severe pain and were unsuccessful.

The knee joint was tender and swollen. A hard mass the lower end of the upper fragment could be felt in the popliteal space. The patella was in place, but above it a defect in the line of the femur could be made out.

The x ray examination revealed a separation of the lower epiphysis with anterior displacement and some rotation (Fig 414). The operation performed upon this patient with the view



Fig 415

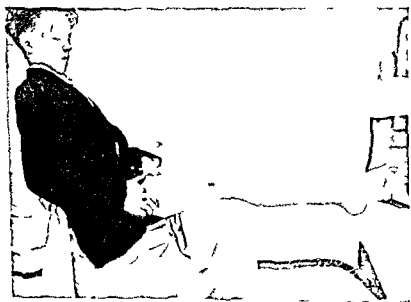


Fig 416

Figs 415 and 416 —Case II Result of treatment—almost normal range of motion

of reducing this displaced epiphysis was performed thirteen days after the injury. As you see, a longitudinal incision measuring 6 inches in length was made over the outer side of the thigh and somewhat anteriorly. It extended below to the line of the knee joint. The site of the fracture was exposed and the displaced fragment was found lying anteriorly. This fragment could be easily reduced when the knee was flexed, but reduction was difficult or impossible when the knee was extended. With the knee



Fig 417



Fig 418

Figs 417 and 418—Case II. Roentgenograms after completion of treatment (Compare with Fig 414.)

flexed the dislocated epiphysis was reduced and held in position by a small Lane plate. An immobilizing plaster of Paris dressing was then applied the knee being semiflexed. One week after the operation the stitches were removed and the wound seemed clean. At this time an attempt was made to extend the knee, but the lower fragment apparently slipped some when this

was attempted and some flexion was maintained until bony union was well advanced.

This patient went home and subsequently had a mild diphtheria. This was contracted at home, and after the wound had been clean for some time a mild infection developed necessitating removal of the plate. It required a long time for the infection to develop. It was introduced at the time of operation. In view of the fact that it developed so late, I am inclined to believe that this was a hematogenous infection, developing at the locus minoris resistentiae, where the plate was inserted.

A year after the operation the boy has almost complete function of the knee-joint, all motions being of practically normal extent.

Dr. Montgomery has recently reviewed the literature dealing with separation of the lower epiphysis of the femur with anterior displacement. Of the 27 cases collected by him, including the 2 which you have just seen, 22 occurred in boys and 2 in girls. In three instances the sex was not mentioned. In 18 of the cases the injury was caused by the leg being caught in a revolving wheel or in machinery, while in 7 cases the fracture resulted from falls or as the result of direct injury. The average age of the patients was 10th years. The youngest age at which this type of fracture is reported is eighteen months, the oldest, twenty years. In six instances the fracture has been compound.

Open reduction of this type of fracture is, I believe, the method of choice, for it would seem to be practically impossible to reduce this fragment by the ordinary methods of manipulation and subsequent immobilization. Acute flexion may be tried, but in the case under consideration the fragment could not be reduced and maintained in reduction until the fracture was exposed. The epiphysis could be easily reduced after the knee was flexed, when direct manipulation could be combined with acute flexion. Even after fixation with a Lane plate it seemed to be advisable to maintain some degree of flexion at the knee joint, for there was a tendency for the fragment to be displaced somewhat when extension was attempted.

It is interesting in this connection to review the different

methods which have been resorted to in treating this type of fracture

Amputation has been resorted to in 14 of the 27 cases recorded. In 9 of these cases amputation was deemed advisable because of the extent of the damage sustained at the time of injury, in 5 cases because of hemorrhage, infection, or an aneurysm developing in the popliteal space. In some of the cases in which proper alignment of fragments could not be obtained by the open method, resection has been resorted to. In these cases good results were obtained, but in a case recorded by Alcock union occurred late with the leg at an angle of 75 degrees with the thigh. As shortening follows this operation, it should only be employed in those cases in which the fragments cannot be brought into alignment by the open operation, and when the deformity and disability resulting from failure to reduce the displacement would be greater than that resulting from shortening of the extremity. In 2 cases (Atkinson) excision of the knee joint has been resorted to. This operation is indicated only when the structures entering into the formation of the knee joint are so badly damaged that the results following reduction of the displacement would be nil.

CASE III—This patient was admitted to the hospital five days ago. One and a half hours before admission he was injured while riding a motorcycle at the speed of 20 miles an hour. He ran into an automobile going at about the same speed. He remembers the crash, and believes that the motorcycle fell upon his left leg. After the fall he became unconscious but regained consciousness on the way to the hospital.

When the left thigh was examined a false point of motion could easily be demonstrated just above the knee joint, which was already markedly swollen. Several small abrasions were found over different parts of the body, one being located to the inner side of the knee-joint. There were no evidences of an injury to the skull or back.

An x ray examination made the following morning revealed a T fracture of the lower end of the femur the lower end of the shaft of the femur being displaced anteriorly, and the condyles,

fairly widely separated by a line of fracture, being displaced backward (Figs. 419 and 420).

Because of the abrasion about the knee-joint an open operation has been postponed up to the present time. During the five days since the injury an attempt has been made to keep the fragments approximated by traction, the knee-joint being somewhat flexed. The attempts which have been made to approx-



Fig 419—Case III T fracture, anteroposterior view



Fig 420—Case III T fracture lateral view

imate the fragments by the ordinary methods have been unsuccessful, and as the abrasions which were received at the time of the accident are clean and covered over, we shall attempt an open reduction of the fracture.

An incision measuring from 6 to 8 inches is made over the junction of the outer and anterior aspects of the thigh. This is carried down to the seat of fracture. The soft tissues have been injured considerably and there is a large hematoma. The con-

dyles are separated. The fracture through the junction of the shaft and condyles is almost transverse. The shaft has apparently acted as a wedge which has split the condyles apart as the force which caused the transverse fracture continued to act.

It is impossible to reduce this fracture unless the condyles are first united for any attempt to bring the shaft in line with the



Fig. 421

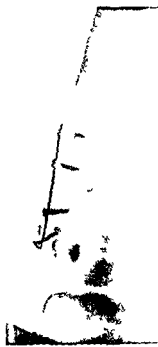


Fig. 422

Figs. 421 and 422 —Case III. Roentgenogram taken a few days after reduction by open operation. (Compare with Figs. 419 and 420.)

condyles forces the latter apart rendering reduction of the deformity impossible. The separated condyles can be easily brought together. I shall fix these by driving a steel wire nail transversely through the two condyles while they are held in apposition. When the condyles are fixed the shaft can be easily brought into alignment for the fracture has caused a small wedge shaped de-

fect between the condyles into which the lower end of the shaft fits snugly. The shaft will be maintained in position by a Lane plate. It is difficult to apply this plate to the outer part of the shaft because of the contour of the external condyle. The plates will, therefore, be placed upon the anterior surface of the femur, the lower end being fixed upon the outer rim of the external condyle, well away from the patella, so as not to interfere with the patella during movements of the joint. Almost perfect apposition of the fragments can be secured after the condyles are nailed together (Figs. 421 and 422).

It is more than probable that the nail which has been used to fix the condyles will have to be removed subsequently. I have used these nails frequently to maintain fixation of bony fragments, and in the majority of cases I have had to remove them, for they have worked out to the skin. They can easily be removed under local or gas anesthesia.

Relative to the use of the plate in this case, and the position in which it is applied, I should like to quote some conclusions reached by Mann concerning the effects of nails and screws in joint surfaces.

Mann believes that nails and screws are tolerated in joint surfaces in the human as well as in experimental cases with surprisingly little reaction. They became and remained firmly embedded in the specimens obtained by him after experimentation. In every case where the nails and screws projected above the joint surface a distinct up-building of the condyle occurred. This increase in the joint level seems to be due always to a growth of bone, and not to an increase in the thickness of the cartilage. In each case where tissue grew across the head of the nail or screw or across the groove of the screw the new tissue showed a reversion to the connective-tissue type. In his experiments the dogs ran about normally after a short convalescence, when the nails or screws remained more or less uncovered. In these cases the scratch or groove on the opposing surfaces was filled in as the projection of the nail or screw was lessened by the upbuilding of the condyle.

I do not believe that the plate which has been inserted will

interfere much with the function of the joint for an effort has been made to place it well to the outer side of the joint cavity and away from the patella. While it is not frequently necessary to place a plate where it might interfere with joint functions such occasions do arise as is indicated by the case now under discussion.

In this connection I would like to quote verbatim the conclusions which Mann arrived at after experimental work concerning the effects of nails and screws in joint surfaces. These are as follows:

- 1 Nails and screws are tolerated in joint surfaces in the human as well as in the experimental cases and with surprisingly little reaction.

- 2 They remained firmly embedded in every specimen recovered.

- 3 In every case where the nails and screws projected above the joint surface there was a distinct upbuilding of the condyle as nature's reply to a rigid metal body projecting into the joint.

- 4 It is exceedingly interesting to find that the increase in joint level seems always due to the growth of bone and not to the increase in the thickness of the cartilage.

- 5 In each case where tissue grew across over the head of a nail or screw or across in the groove of the screw the new tissue showed a reversion to the connective tissue type.

- 6 Even when the nails and screws have remained more or less uncovered the dogs have run about normally after a short convalescence.

- 7 In each case the scratch or groove on the opposing surfaces was filled in as the projection of the nail or screw lessened by the upbuilding of the condyle. The defect was apparently entirely filled in all but one specimen and this was closing in nicely at the end of six weeks.

8. As a point in technic it seems better to swing a hinge-joint freely at the time of the operation in order to scratch the groove made necessary by a badly placed nail or screw and thus save the time and pain during convalescence which would be required in scratching the groove little by little later.

MYOSITIS OSSIFICANS DEVELOPING IN A CLEAN INCISED ABDOMINAL WOUND

Summary. A patient who developed a hard, bone-like mass in a clean incised wound within seven weeks after operation; diagnosis of circumscribed ossifying myositis, etiology—rarity in clean incised wounds, prognosis—ultimate absorption if left alone

THIS patient is twenty-seven years old. For over a year he has experienced from time to time an aching pain in the epigastrium which would develop early in the evening and last for half an hour or somewhat longer. At times the pain would develop at 1 or 2 o'clock in the morning, and last two or three hours. At no time has nausea been experienced and there has been no vomiting. Bismuth at first gave relief. During a few weeks before the patient entered the hospital the pains were experienced during the day, and lately he has had almost continuous pain and distress, which has varied considerably in intensity. If he remained upon a liquid diet the distress could be controlled to a considerable extent.

The patient has had several attacks of acute arthritis during the past year. The general examination is negative except as regards the heart. The apex-beat is in the seventh intercostal space, two fingerbreadths external to the nipple line. The impulse is heaving. A loud diastolic murmur is heard over the base of the heart which is transmitted to the apex. The patient has a distinct aortic regurgitation, but the heart is compensated.

A test-meal revealed no retention of food. Total acidity of gastric juice is 95; free HCl, 50. Occult blood has been found in the stool from time to time. The patient has a typical history of duodenal ulcer, and on June 15, 1917, a posterior no-loop gastro-enterostomy was performed, the pylorus being temporarily occluded by plication with two silk sutures. The postoperative course of this case was very smooth, no vomiting or distress being

noted. Following the operation a temperature was noted for four days. On the third day it reached 102° F. It subsided quickly and did not recur. During this rise in temperature there was no inflammatory reaction in the abdominal wall around the incision. The temperature was thought to be due to a bronchitis never severe from which the patient suffered at this time.

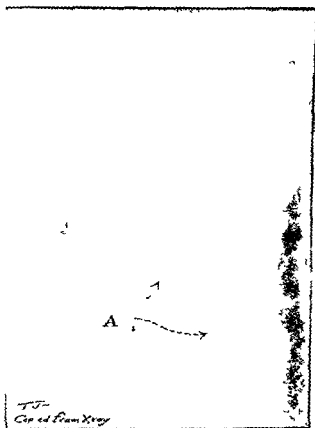


Fig. 423—Copy of x-ray picture showing approximate size and location of the region of ossification (1) in anterior abdominal wall.

Patient left the hospital thirteen days after the operation much relieved, the pain and distress following the taking of food having completely disappeared. After going home a cough developed which bothered him considerably. About three weeks

after the operation the patient noticed some tenderness in the scar. The tenderness was so marked that the patient could not wear a belt without causing him considerable discomfort.

A little over seven weeks has now passed since the operation, and there is felt the whole length of the scar a definite mass measuring a fingerbreadth or more in width. This mass occupies the site of a wound in which there has been no suppuration and no crushing of abdominal muscles. At the present time the scar is but slightly tender and causes no discomfort.

An x ray reveals a distinct shadow upon the right side, corresponding to the mass which can be felt in the abdominal wall. The shadow is much larger than would be expected from the findings elicited by palpation (Fig 423).

The mass which can be felt has the consistency of bone, and I believe that this is a case of ossifying myositis developing in a clean incised abdominal wound.

Etiologically, circumscribed ossifying myositis may be divided into the traumatic and non traumatic forms, and into those associated with defects of or diseases of the central nervous system, such as spina bifida, tabes, syringomyelia, transverse myelitis, and parietic dementia.

The majority of cases of circumscribed ossifying myositis are not caused by repeated injuries, but follow one severe injury caused by blunt force in which there is considerable laceration of muscle fibers associated with hematoma formation. Of the 296 cases of ossifying myositis collected by Schulz, not less than 232 gave a history of one severe injury caused by blunt force. Such injuries are dislocations, especially dislocation backward of the elbow, dislocation of the clavicle, and shoulder. This process may follow the bite or kick of a horse, a fall upon an object with sharp corners, upon a wooden or steel beam, or a muscle injury caused by excessive or unguarded muscular action during athletic sports, such as football, baseball, or tennis.

This case is of especial interest because the ossifying process followed a clean incised wound of the abdominal wall in which there was no noteworthy reaction during the process of repair. In an article published by Kuttner in 1910 dealing with circum-

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Fig 423 -- Copy of x-ray picture
region of ossification

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scribed ossifying myositis he states that he could find but 5 cases recorded in which the process followed a wound caused by a sharp instrument producing a clean incised wound

Bender reports a case in which bone developed in the biceps brachii after a punctured wound with a darning needle Schwarz a case in which bone developed in the glutei muscles after they had been cut with glass glass being found embedded in the bone Werner described an ossifying process in the biceps after a punctured wound Cranwell described 2 cases in which bone developed in the muscles after an incised wound In one instance the patient aged twenty seven was whittling when the knife slipped and pierced the inner part of the thigh passing through the adductor group of muscles There was considerable hemorrhage but the wound healed rapidly After some months a piece of bone of considerable size developed in the adductor muscles This was later removed The second case reported by Cranwell occurred in a man aged twenty two Three months before he was operated upon he sustained a stab wound of the thigh There was considerable hemorrhage The wound suppurated and healed slowly Soon a painful mass developed along the track of the stab wound This mass which proved to be bone was later removed It was attached to the femur by a broad base These few cases would seem to indicate that ossifying myositis develops but very rarely after incised wounds

Three cases are reported in which bone has developed in laparotomy wounds Two of these were observed by Ropke and one by Rubesch I would like to review one of the cases reported by Ropke

The patient forty years of age was operated on for perforation of a duodenal ulcer ten hours after perforation An incision was made through the right rectus muscle above the navel The perforation was closed covered with omentum and a gastroenterostomy performed The abdominal incision was closed with catgut silk being used for the skin suture Repair occurred without suppuration Five weeks afterward an obstruction developed suddenly and a second operation was performed an anastomosis being made between the proximal and distal loops

of the bowel used in making the gastro-enterostomy. The abdomen was opened through the old scar at the level of the navel. A piece of bone measuring 2 cm. in length and 1 cm. in width was found in the right rectus muscle.

While the case under consideration has not been operated on, and the new tissue which has formed has not been examined, I do not believe that there is any doubt as to its character. Nothing definite is known concerning the factors which cause the formation of bone in clean incised wounds. The muscle-fibers were not lacerated in this case because no tension was placed upon the incised tissues. Retractors were not used. The incision passed through the *lineæ transversæ*, and this suggests that osteoblasts may have remained dormant in those lines which represent the extension forward of the ribs, and that these may have proliferated to form this new bone.

I shall not remove the bone. The tenderness in the scar is subsiding and the chances for absorption of this newly formed tissue are good. In some instances the ossifying process reaches its full development rapidly, and the bone which is formed undergoes little or no change, while in other cases the process develops fairly rapidly, and then absorption of the bone begins, so that eventually no or but few traces of the newly formed bone can be found after *x*-ray examination.

As there has already been considerable improvement as regards tenderness and local discomfort no attempt will be made to remove the bone. It will cause little or no discomfort or inconvenience even if absorption does not occur.

BLASTOMYCOSIS AND SPOROTRICHOSIS

Summary Clinical history, diagnosis, and treatment of blastomycosis and sporotrichosis as illustrated by 3 cases, discussion of a case of generalized blastomycosis by Dr A H Montgomery

THE type of skin lesion which I am about to present is usually seen by the dermatologist. Occasionally, however, the surgeon is called upon to make the diagnosis, and in some instances surgical measures must be resorted to because the lesion has resisted other lines of treatment and has spread. I shall ask Dr Montgomery to discuss the subject of generalized blastomycosis, and to give the facts regarding a case which he has had under observation for some time, and shall show you the photographs and give you the history of a case of sporotrichosis which was in the clinic a short while ago. I shall present the photographs of this case to show how it differs from blastomycosis, with which it is sometimes confused.

This patient, Mr A S, fifty years of age, has had a lesion about the left elbow for a number of years. He gives the following history. In August, 1898, an abscess appeared above the left elbow. This was incised and did not heal. Four months later the diseased tissue was excised. The lesion soon recurred, and it was curetted from time to time until 1905. At this time the Finsen light treatment was employed, without any noticeable improvement. In 1906 large doses of potassium iodid were employed and the x ray was used. The lesions which existed were practically healed by this line of treatment. The skin at the site of the former lesion was slightly tender, but the ulcer healed. In 1915 the lesion appeared again, but healed after ten salvarsan treatments. It remained healed during the winter, but then appeared again. Salvarsan could not be obtained at this time and the x ray was again used. At first the disease seemed to be controlled by this treatment, but later it began to progress.

step until we can determine whether or not the disease has been removed, so as to avoid any possibility of infecting the thigh, if it is deemed necessary to take the grafts to cover this defect (Fig 425)

I shall now ask Dr. Montgomery to give you the history of a case of generalzed blastomycosis which he has had under observation for some time. This case has lived longer than any case

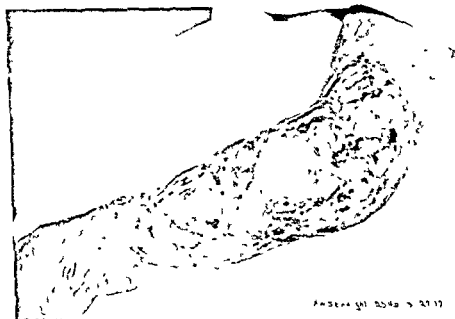


Fig 425—Appearance of defect after the skin lesion has been excised. A pedunculated flap has been turned from the forearm to cover the head of the radius. The remaining parts of the defect have been covered by epidermal grafts. This picture was taken some four weeks after the operation.

of generalized blastomycosis of which I have knowledge, with the exception of one, which I believe has completely recovered.

DR. A. H. MONTGOMERY'S DISCUSSION OF A CASE OF GENERALIZED BLASTOMYCOSIS

The patient to whom I refer, Mr. A. S., forty-one years of age, was admitted to this clinic the 22d of February, 1915. He was a tinsmith by trade, but for some time he had worked as a janitor in a seed store. He has had nasal catarrh since childhood, denies venereal disease, and does not use tobacco or alcohol. One child is living and well.

The present trouble began the middle of November 1914 when the patient was taken sick with a cough and the general symptoms of an acute cold. The symptoms persisted in spite of treatment and the patient commenced to raise considerable sputum especially in the morning. There was little change in the symptoms until about January 1 1915 when the patient coughed up a tablespoonful of bright red blood. Malaise and weakness increased. Night sweats developed and the patient



Fig. 426 — Appearance of skin lesion on outer right trochanter in case of generalized blastomycosis

became so miserable that he had to stop work. At this time the calf of the left leg became swollen and painful and a peculiar dry crusted ulcer appeared over the left shoulder blade and over the right hip and left buttock. Hot applications were placed upon the swollen and painful calf but the condition gradually became worse. On February 28 1915 the swelling was incised and about 2 tablespoonfuls of thick bloody pus was evacuated. The leg improved for a few days but then began to swell again.

and became painful. A tender swelling also appeared on the right forearm just above the wrist. The patient was then sent to the hospital.

An examination made February 22, 1915, revealed a poorly nourished middle aged man with loose skin and poor muscular development. On the scalp over the left frontal eminence is a slightly elevated flat lesion measuring 1 x 1.5 cm. with a rather warty, light yellowish surface, with somewhat reddened borders.

Lesions with similar characteristics measuring 5 cm. in diameter are found over the lower third of the left scapula, over the region of the right trochanter (Fig. 426) over the left buttock and just above the inner end of the right gluteal fold. A fluctuating mass the size of a hazelnut is found over the right occipital region. At the inner extremity of the right eyebrow is a hard circumscribed slightly reddened mass the size of a bean. An indurated mass the size of a man's fist is found in the muscle of the right calf. The incision made February 8th measuring 1 cm. in length has not healed. Dark hemorrhagic pus is oozing from the opening. A fluctuating mass about 3 cm. in diameter is found just above the lower end of the right ulna. The nails are hyperkeratotic. Examination otherwise negative. Temperature 100.2, Γ pulse 108, respirations 32.

Urine negative.

Blood examination. Hemoglobin 90 per cent, W. B. C., 16,400. Wassermann negative.

Two days after admission to the hospital the abscess in the calf of the left leg was opened and a cupful of thick bloody pus removed. During the next four weeks abscesses appeared in the calf of the right leg, on the lower part of the right forearm and just above the upper border of the right patella. The cavities were packed with iodoform gauze after incision and all healed rapidly. The skin lesion over the right trochanter was excised, the wound healing by primary union.

Numerous blastomycetes were found in the pus removed from the different abscesses (Fig. 427).

Blood cultures were negative.

Stained sections of tissue removed from the skin lesions and

abscess cavities revealed foci of central necrosis surrounded by areas of round cell infiltration containing many giant cells and some polymorphonuclear leukocytes

x Ray examination of the chest revealed a generalized fibrosis of both lungs a picture very similar to that associated with an extensive tuberculosis of the lungs A small calcified nodule is found in the left lung

Repeated examination of the sputum failed to reveal either tubercle bacilli or blastomycetes

The patient was placed upon increasing doses of potassium iodid and advised to see that the hygienic conditions surrounding



Fig 427 — Basomycetes n pus High power Note doubly refract ve membrane about organisms

him were of the best The temperature with evening elevations up to 101° F decreased to 99° F and his general condition began to improve under this treatment The skin lesions continued to spread slowly in spite of improvement in the general condition The patient left the hospital May 7 1915 On May 18 1915 he reported to the clinic The abscesses were about healed and the skin lesions were somewhat improved at this time During the

past five weeks he has gained 11 pounds and the cough is much better. The dose of potassium iodid has reached 200 grains a day.

The treatment was continued until November, 1915, when the patient, of his own accord, discontinued the potassium iodid for several weeks. During this time another abscess developed at the site of the one in the left leg which had been previously drained. The abscess promptly healed after drainage and resumption of the potassium iodid.

In the spring of 1916 he moved to New York State, where he has been working on a farm up to the present time.

The amount of potassium iodid has been gradually increased up to as high as 700 grains a day. He has continued to take this amount quite regularly. For short periods it has been necessary to reduce this amount one-half because of the symptoms of iodism. He has gained 20 pounds in weight since leaving the hospital and feels well and strong. All the lesions have healed, with the exception of one on the face, which seems to be increasing some in size.

I have recently reviewed the 44 cases of generalized blastomycosis which I could find reports of. In these 44 cases the abscesses were distributed as follows:

	Cases.
Lungs	42
Pleura	7
Larynx	2
Trachea and bronchi	1
Thyroid cartilage	1
Retropharyngeal and subpleural	2
Myocardium	2
Brain	8
Spinal cord	3
Dura	5
Spleen	18
Liver	11
Kidney	12
Adrenal	2
Pancreas	4
Prostate	5
Psoas and other deep abscesses	5
Pericardium	2
Peritoneum	1

	Cases.
Skin	3
Bones exclusive of the vertebræ	16
Vertebræ	9
Joints	9
Lymph-nodes	9
Muscles and soft parts	4
Epididymis	2
Testicle	1

Of the greatest surgical importance are the abscesses developing deep in the muscles and the bone and joint lesions. In the generalized cases, as just mentioned, bone lesions were noted in 56.8 per cent. and joint lesions in 20.4 per cent. Definite sequestra were observed in 2 cases, but in the rest the process consisted of caries. In 20.4 per cent the vertebræ were affected, the process resembling closely that found in tuberculosis.

The following table indicates the frequency with which the different bones and joints have been affected in the generalized cases:

Bones		Joints.	
Tibia	10	Elbow	5
Radius	1	Knee	8
Ulna	3	Ankle	3
Ribs	9	Wrist	3
Skull	6	Shoulder	1
Vertebræ	9	Hip	1
Carpal bones	2	Sternoclavicular	1
Metacarpal	2		
Tarsal	2		
Metatarsal	5		
Sternum	3		
Patella	2		
Femur	3		
Fibula	2		
Ilium	2		
Sacrum	1		
Humerus	1		

Of the viscera, the lungs (42 times) and pleura (7 times) are most frequently involved. Empyema was noted in 1 case. The spleen was involved in 18 cases, the liver in 11, and the kidneys in 2. The prostate was involved in 5 cases. Lesions were found in

different parts of the brain by LeCount in 8 cases Meningitis was observed three times

It is interesting to note in this instance that the disease apparently began with an acute infection of the respiratory tract. The patient worked in a seed store, where he undoubtedly breathed much vegetable dust. The relation of this work to the disease is somewhat problematic, owing to the considerable period elapsing between the time when he gave up this work and the appearance of the disease.

The diagnosis in this case could be made with ease by the character of the pus evacuated from the abscesses in the calf and of the skin lesions. It is of unusual interest because of the length of the clinical course of what is apparently a generalized case of blastomycosis with definite improvement of the general condition and local lesions. I know of but one case of undoubted generalized blastomycosis that has recovered. The disease in the present case has lasted over two years and eight months with continued improvement. It is possible that the disease may progress at any time and prove fatal, but at the present time the indications are that the patient will continue to improve.

DR LEWIS. While these cases are being discussed I would like to show the photographs of another lesion which may come to the surgeon for diagnosis and treatment which is frequently mistaken for blastomycosis. This lesion does not resemble that of blastomycosis at all. It is so typical in its clinical manifestations that the diagnosis should be made without any difficulty.

These photographs were made from a boy twelve years of age who came to the clinic in August, 1915. His home was in Morris Illinois. He gave the following history. One day while playing in a pasture he was chased by a steer. In getting out of the pasture he scratched his left foot at the instep on a barbed wire. The pasture was used as the temporary quarters of cattle and horses shipped in from neighboring states. These usually were shipped from Kansas City. The last consignment of cattle had come from Iowa, near the Mississippi River.

The scratch healed and no attention was paid to it until several days later, when an infection developed at the site of the

ulceration of the skin about the instep, with subsequent lymphangitis resulting in nodule formation and softening

This is a typical history of sporotrichosis, and I know of no disease which is more typical clinically, both as regards the history and character of the lesions. I am indebted to Dr. Barney Sharp for the isolation of the organism from the primary focus and the peculiar mucoid pus quite characteristic of the disease, which was evacuated *from the nodules on the leg* (Figs. 430, 431).

In 1912 Dr. Walter Hamburger published in the Journal of the American Medical Association a case of this disease observed in Dr. Bevan's clinic. At that time he found in American literature 28 cases including the one reported by him, of undoubted sporotrichosis, proved by positive cultures of the organism, which were reported during the thirteen years following Schenck's original publication. In addition he collected 30 cases of highly probable sporotrichosis, cases clinically identical with the 28 positive cases, but without positive cultures.

The geographic distribution of these cases was very interesting. 22 cases occurred in North Dakota, 13 in Kansas, 5 in Nebraska, 2 in Illinois, 3 in Missouri, 2 in New York, 2 in Minnesota, 1 in California, 1 in Iowa, 1 in Indiana, 1 in New Jersey, 3 in South Dakota, 1 in Montana, and 1 in Wisconsin.

The following clinical varieties of the disease have been given by Beurmann:

A Localized sporotrichosis with sporotrichotic chancre and ascending lymphangitis ending in nodule formation and softening and local lymphadenitis. The case under discussion is a typical example of this variety.

B Disseminated gummatous sporotrichosis, multiple subcutaneous nodules distributed without systematic arrangement throughout the body. Small hard, painless round masses develop early. Later, large and small soft cold abscesses form, no ulceration.

C Disseminated ulcerative sporotrichosis. Multiple lesions which may resemble those of tuberculosis or syphilis develop. Ecthymatous, rupial or furuncular lesions may also occur or there may be a combination of these.



Fig 430—*Sporothrix* Smear from culture on potato Oil immersion

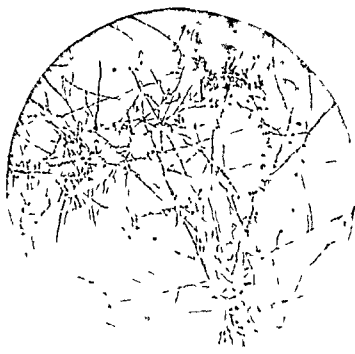


Fig 431—*Sporothrix* Hanging drop from broth culture Oil immersion

D Extracutaneous sporotrichosis with localization in mucous membrane, muscles, bones, joints, eye, synovial membrane, kidney, or lungs

The case under consideration is typical both in history and clinical manifestations of the first class

The disease responds readily to treatment. In this case a piece of tissue was removed from the ulcer over the instep for histologic examination and one of the softened nodules along the course of the lymphatics in the thigh was opened so that a bacteriologic examination could be made. The boy was placed upon 15 grains of potassium iodid a day and a weak iodin dressing was applied locally. Within a short while distinct improvement was noted in the lesions, and at the end of four weeks they had practically disappeared.

CLINIC OF DR HERMAN L KRETSCHMER

PRESBYTERIAN HOSPITAL

TUBERCULOSIS OF THE KIDNEY—PRESENTATION OF 3 CASES

Summary Types of renal tuberculosis, renal tuberculosis always secondary to tuberculosis elsewhere in the body, early renal tuberculosis always unilateral, routes of infection—hematogenous most common—tuberculosis of bladder usually secondary to renal tuberculosis, symptoms of renal tuberculosis—their relative frequency and diagnostic value, results of cystoscopy, sources of error in estimation of renal function, operative technic—treatment of the ureter, infected perirenal fat a cause of postoperative renal fistulae, importance of its proper management

July 26, 1917.

PATHOLOGICALLY we recognize two types of renal tuberculosis:

1. The acute or subacute miliary tuberculosis
- 2 Chronic renal tuberculosis

The acute miliary occurs as part and parcel of a general miliary tuberculosis, and as such has a medical but not a surgical interest

Chronic renal tuberculosis is often the only apparent tuberculous lesion that the patient presents, so that the designation "primary renal tuberculosis" has been used. This, however, is not true, pathologically speaking, because careful study enables one to discover evidences of tuberculosis elsewhere in the body. These evidences, at times, cannot be easily demonstrated clinically, such as a healed focus in the lung or a latent or healed tuberculosis of the mesenteric lymph-glands. Only the most painstaking examination at autopsy in which the entire post-mortem would fail to show the presence of tuberculosis elsewhere would justify one in differentiating primary renal tuberculosis. In the cases in which there is associated evidence of tuberculosis of the bones and joints and cervical lymph-nodes there is no

difficulty in demonstrating a primary focus. In the cases dying of renal tuberculosis in which a careful autopsy is carried out, we are generally rewarded by finding an old healed lesion in some other part of the body. This part is generally glandular, although one may not be able to demonstrate such a focus clinically. It is a good clinical rule to consider renal tuberculosis, although primary in the genito urinary tract, as being secondary in the body.

Renal tuberculosis is essentially a disease of adult life, most of the cases occurring between the ages of thirty and fifty. Although the largest percentage of cases occur between these ages, cases occur in people under thirty years of age very frequently, and cases of tuberculosis of the kidney in patients over fifty are not at all uncommon. The oldest patient I have seen was a woman of sixty three, the youngest, a girl of six.

The question of incidence of sex in the occurrence of renal tuberculosis is an interesting one, and one that is by no means settled. The occurrence of renal tuberculosis and the reporting of cases depend upon several factors. First, upon the practice of the individual operator. In the practice of one who sees more men patients than women, as many urologic surgeons do, the occurrence would be in favor of the males, while the opposite would be true in the statistics of the surgeon whose practice is of a gynecologic trend. Speaking from my own experience, I may say that in my last 77 consecutive cases of renal tuberculosis there were 40 females and 37 males.

It has been said that the diagnosis is made oftener and much earlier in women than in men; hence more women are operated upon than men. In men the diagnosis is often made relatively late, so that more men than women are beyond surgical relief when the case is diagnosed, and, therefore, while more women are operated upon, more men are refused operation.

Side Affected—That early renal tuberculosis is a unilateral disease there is no doubt. This fact has been proved time and again in large series of cases in which great care has been exercised in studying the so called healthy kidney. Patients operated upon in whom this point has been determined and in

whom the after course has been observed have proved this question. These clinical facts are at variance, however, with the autopsy reports, according to which renal tuberculosis is a bilateral disease. This is true at the autopsy table, and when these statements are made one must not forget that these are the findings in patients who died, and who were not subjected to early treatment. Statistics as to whether the remaining kidney subsequently became tuberculous are not at hand. I think, however, that one is justified in stating that renal tuberculosis is a unilateral disease in the great majority of cases, and if the infected kidney is subjected to early surgical interference the opposite kidney remains free from disease.

The statement is frequently made that renal tuberculosis occurs more frequently on the right side because the right kidney is more movable than the left. Statistics prove that the right kidney is more often the seat of tuberculosis than the left, but the percentage is so small as not to have very much significance. In Küster's statistics there were 189 cases of right-sided tuberculosis as compared to 163 cases of left-sided tuberculosis. These figures, I think, are about the average.

Routes of Infection.—*I. Hematogenous.*—Clinical interest has always been directed to the routes of invasion. How do the tubercle bacilli get to the kidney? At the present time it is conceded that in the largest number of cases the tubercle bacilli reach the kidney by the blood-stream. This conclusion is based upon facts gleaned from three sources: First, clinical observation; second, autopsy findings; third, animal experiments. One is now in a position to determine by means of cystoscopy and ureteral catheterization whether or not the kidney is the only part of the urinary tract to be the seat of tuberculosis. In cases in which there is an involvement of the bladder one is often able to state that the kidney was diseased before the bladder, because in the former we find evidences of far-advanced tuberculosis, whereas the bladder lesions are either recent or they may be localized to the neighborhood of the corresponding ureteral orifice. In the cases that come under observation early in the course of the disease there may be no bladder involvement at all. These

clinical facts have also been proved at autopsy in cases of unilateral renal tuberculosis. Occasionally one may observe cases of renal tuberculosis without involvement of the bladder in patients who refuse to have any surgical treatment. These patients are often treated in various inefficient ways. Later when they again present themselves for examination cystoscopic examination will show that there is now evidence of tuberculosis localized around the corresponding ureteral orifice. Further clinical proof that genito urinary tuberculosis is primarily renal may be adduced in early cases before severe bladder changes have taken place in the following way. If these patients are subjected to routine cystoscopic examination after the diseased kidney has been removed it is not uncommon to see the bladder changes completely disappear so that the bladder mucosa appears normal.

Although animal experimentation has not been very extensive there are noteworthy reports at hand particularly the work of Pels Leusden who was able to produce renal tuberculosis in animals by intravenous injection of tubercle bacilli that closely resembled human renal tuberculosis.

II *By Direct Extension*—Renal tuberculosis that owes its origin to direct extension from a neighboring tuberculous process such as tuberculosis of the spine, suppurating glands, a tuberculous empyema, are medical curiosities and the cases reported are practically all in the older literature.

III *By Extension Up the Ureter*—Owing to the fact that tuberculosis of the kidney may be present for a long time without producing symptoms and because of the fact that the first symptoms are often bladder symptoms, the older urinary surgeons taught that the primary lesion was vesical and the secondary lesion was renal, which lesion was due to the direct extension of the process up the ureter. The error of this teaching was corrected with the advent of the cystoscope and the more careful study of the bladder which it permitted, so that today many men question and others firmly deny the existence of primary bladder tuberculosis.

Should the bladder be infected by tuberculosis secondary to

tuberculosis of the prostate or seminal vesicles, the possibility of the kidney becoming infected through the lumen of the ureter exists, inasmuch as I have shown that the ureteral orifice may not always prevent regurgitation of the fluid from the bladder up into the kidney pelvis; and that the fluid may be transported from the pelvis to the kidney parenchyma has been proved by cases in which the kidneys were removed after pyelography, which showed the silver salt (collargol) as far as the tubules, and in some cases in the glomeruli. In these cases (collargol), however, as a rule a good deal of pressure was used, a fact that would hardly come under consideration here. Experimentally it has been proved by Bauereisen that there is a lymphatic connection between the bladder and kidney by the lymphatics of the ureter. This offers a theoretic route by which tubercle bacilli might reach the kidney from the bladder.

IV. *Lymphogenous*.—In this connection one may briefly discuss the observations of Tendeloo and Bongersma, who have advanced the idea that tuberculosis of the kidney may be lymphogenous in origin, basing their theory on a case that came to autopsy in which Tendeloo found cheesy para-aortic lymph-glands on the same side on which he found a very advanced tuberculosis of the kidney; on the same side he also found adhesions between the diaphragm and the lung, the regional lymph-glands of which showed tuberculosis. Because of the presence of these tuberculous lesions, all being on one side of the body, he believed that the route of infection was lymphogenous and was something about as follows: "The bacilli were carried from the lung and bronchial lymph-glands through the pleura and diaphragm to the para-aortic glands, and from there into the kidney."

That the tubercle bacilli may be transported retrograde from the bronchial to the aortic glands he believes, and to substantiate his views he calls attention to occasional finding of pigment in the aortic glands. His views have not been universally accepted. As a matter of fact, they have found very few adherents. Doubtless this is due to the fact that the evidence, clinical and otherwise, is overwhelmingly against them, and that they are based

on but a limited number of observations. As arguments against the lymphogenous route of infection, one may mention

- 1 In the largest percentage of cases there is an absence of adhesions between the pleura and diaphragm—one of the conditions which Tendeloo lays much stress upon in order to render possible a retrograde transport of bacilli

- 2 Autopsy statistics from many cases of renal tuberculosis fail to show that the retroperitoneal glands present evidences of tuberculosis

- 3 Cases have been reported in which adhesions are found on the side opposite to the diseased kidney. It has furthermore been suggested that although all the pathology was found on one side of the body in Tendeloo's case the sequence of events may not have been just in the order that he assumed

SYMPTOMS

For the purpose of convenience these may be divided or considered under the following headings

- 1 Kidney symptoms
- 2 Bladder symptoms
- 3 Symptoms due to changes in the urine

Kidney Symptoms—As a rule kidney symptoms do not play an important rôle in the clinical history. Renal palpation may or may not be of value as an aid in diagnosis. Often even in well advanced cases palpation may be entirely negative, so that while the kidney after removal may prove to be very materially increased in size yet clinically it would be impossible to detect enlargement by palpation. Again in other cases the kidney may be palpable especially in that group of cases in which its normal mobility has not been lost. This occurs in cases in which the disease has remained confined within the renal capsule.

Tenderness to Pressure—This may be variable. It may be demonstrated by ordinary palpation or by deep pressure with the thumb placed in the angle made by the last rib and the deep lumbar muscles. Should these fail to elicit tenderness I often resort to fist percussion, which I first saw Zuckerkandl use in his clinic in 1906.

Great care must be used in evaluating these two symptoms, and we should bear in mind the possibility of both of these symptoms being elicited on the side of the normal kidney, hence leading to an erroneous conclusion. Both of these symptoms may be due to an enlargement or compensatory hypertrophy of the normal kidney. I know of at least one instance in which the presence of an enlargement and tenderness were attributed to a tuberculous kidney, and it was decided to remove this enlarged and tender kidney. Cystoscopic examination made just before the operation demonstrated the enlarged and tender kidney to be the normal one. The tuberculous kidney was small and contracted and hence escaped detection upon physical examination. In one of the cases to be operated on this morning this phenomenon is present, namely, the patient has pain and tenderness on the right side, whereas the tuberculosis has been proved to be on the opposite side.

Colic.—Renal colic associated with or as a symptom of renal tuberculosis is sometimes due to the presence of calculi. In the largest percentage of cases there are really incrustations of necrotic tissue in the tuberculous cavities. In other instances one may find incrustations of tuberculous ulcerations in the pelvis. Furthermore, in other cases true calculi consisting of phosphates and carbonates may be found. In rarer instances oxalate and uric acid stones are found associated with tuberculosis of the kidney. Doubtless in many cases such calculi are merely coincidents with the tuberculosis. In one of the cases that we will demonstrate this morning such a coincidence of lesions exists. The only other instance in which I have seen this diagnosis made and verified by operation appeared when I was working in Zuckerkandl's clinic in the Rothschild Hospital in Vienna. Whether or not in our case we are dealing with a primary or secondary stone, and the true composition of the stone, will be determined after the kidney has been removed.

Bladder Symptoms.—Frequency of Urination.—In the majority of cases one can elicit a history of frequency of urination. In some patients the frequency of urination is the first symptom that the patient observes, that is, it is the first symptom to at-

tract the patient's attention to the fact that something is wrong. One of the characteristics of frequency associated with renal tuberculosis is its nocturnal occurrence. This may necessitate arising once or twice each night, or the patient may be disturbed as often as every fifteen to thirty minutes. As a rule the nocturnal frequency is gradual in onset and progressive. At times frequency may be so marked during the day that the patients become true invalids, being unable to perform their social duties or attend to business. Frequency is oftentimes associated with great urgency, so that the patients are obliged to respond at once, and if they are not in a position to respond they are unable to control the act so that the urine escapes and soils their linen. This incontinence is one of the earliest symptoms and may be present both day and night. Naturally this symptom would be more aggravated at night when the patient is asleep. At times one may also see this symptom present in patients who do not have any special frequency of urination, and it has also been noted in patients who have had no bladder involvement, but this is the exception and not the rule. As a rule the incontinence occurs in late cases in which there is more or less extensive involvement of the bladder with ulceration of the mucous membrane.

Pain—As a result of the tuberculous involvement of the bladder the bladder mucosa becomes sensitive so that the act of micturition is painful. The pain may be localized to the bladder, but more often it radiates along the urethra. The pain may or may not be relieved by the act of urination and at other times the relief is of very short duration. The bladder is sensitive even to the introduction of warm bland fluid, such as water or normal salt so that distention by these bland fluids for cystoscopic examination produces a great deal of pain. The pain is also much aggravated by irrigations with silver nitrate. Many patients volunteer the information that silver nitrate irrigations always make them worse so that this form of treatment finally becomes intolerable.

Suprapubic Tenderness—Associated with bladder pain many patients are exquisitely tender, so that women, for example, are

unable to wear their corsets, the pressure of the corsets producing a great deal of bladder pain. To the examining hand these patients are very sensitive, so that one cannot make much pressure over the pubes. Indeed, because of this sensitiveness, examination of the pelvis causes very much pain, and satisfactory pelvic examination in some of these women is impossible without resorting to the use of an anesthetic.

Cystoscopic Findings.—For a good many years it was taught that tuberculous cystitis had a definite cystoscopic picture, by which it was always possible to recognize it. This we now know is not the case, many cases presenting a cystoscopic picture no different from that of any other cystitis. The mucosa is reddened and loses its gloss, the blood-vessel markings disappear, and the mucous membrane becomes swollen and edematous. Often there may be seen fibropurulent shreds adhering to the mucous membrane, and here and there one sees a small ulceration. These ulcerations now and then show the presence of small tubercles at the periphery. Tubercle formations in the bladder have a predilection as regards their location, being found around the ureteral orifice on the side of the affected kidney and often on the anterior wall of the bladder. Exceptions to these areas of localization, however, may be found. Indeed, it may be possible to find tubercles along the ureteral orifice of the opposite or well kidney. Such a cystoscopic picture we saw recently in one of our cases in which the diagnosis that would have been made if we had confined ourselves to the cystoscopic findings alone would have been incorrect and might have led to the removal of the wrong kidney.

Changes in the Urine.—1. *Demonstration of Tubercle Bacilli.*—This is by all odds the most important symptom of renal tuberculosis, and it is the one finding that clinches the diagnosis. It is the one positive finding, and, therefore, it gives one a feeling of extreme satisfaction to be able to demonstrate tubercle bacilli in a specimen obtained per ureteral catheter from the kidney. The demonstration of the organisms I believe can be made oftener than we generally suppose. Many men have the impression that the demonstration of tubercle bacilli in the urine is a task

bordering on the impossible. I believe that the organisms can be demonstrated in the urine in upward of 90 per cent of the cases.

2 *Pyuria*—Perhaps more constantly present and more easily demonstrable than the presence of the tubercle bacillus is the presence of pus in the urine. The amount of pus may vary from one examination to another, so that the specimen examined to day may show a great deal of pus and a second specimen examined tomorrow may be relatively free from pus. I recall one such instance in which at examination we were unable to demonstrate the presence of pus cells in the urine and yet at operation a very advanced tuberculous kidney was removed.

3 *Hematuria*—This is not always present, especially early in the disease, although tuberculosis is one of the three most frequent causes of hematuria the other two being stone and tumor. Out of a series of 238 consecutive cases of hematuria that were reported in the Journal of the American Medical Association, 24 in 1917, 33 were due to tuberculosis of the kidney, 11 of which were the type that produce hemorrhage in the urine, 22 of which were the type that produce hematuria as the first. The amount of blood is variable—it may be microscopic or, again, may be so great as to overshadow and obscure all the other symptoms of renal tuberculosis. The hematuria may be so profuse and continuous that the life of the patient is endangered calling for a nephrectomy. After the kidney has been removed knowledge of the fact that the hemorrhage was due to tuberculosis is first obtained. Terminal hematuria with the passage of small blood stained shreds of pus is seen more frequently than is the presence of profuse hematuria. This occurs generally at the end of urination and is associated with a great deal of pain.

CASE I

Miss E. G., aged thirty six

Present Complaint—Pain over right side of the upper abdomen and bladder, frequency of urination and burning on urination. The patient's present attack began last March with irritation of the bladder, frequency of urination, and finally dull pain, seemingly within the bladder on the right side. Previous

to this time the patient had three similar attacks. In September, 1915, the patient stated she had the first kidney symptoms, manifested by chills, fever, and enlargement of the right kidney, lasting for three weeks, during which time she was in a hospital. Two similar attacks followed, one in January, and the last one in April, 1916. From April, 1916, to March, 1917, the patient enjoyed good health and was free from kidney or bladder symptoms.

The present attack began insidiously in March, with bladder irritation, frequency of urination, and some burning and incontinence. The patient states that she was compelled to urinate about every hour during the day and from three to seven times during the night. The pain over and within the right side began rather insidiously, seeming to be more of a continuous dull ache. The pain is aggravated by exertion and fatigue. The pain is associated with burning at times, and is confined to the right side so the patient cannot lie on that side. During the last two months the patient has limited the amount of fluid intake for fear of increasing the frequency. The incontinence is generally most marked at night when she is sound asleep. The calls to urination are imperative and she must respond to the desire at once. If she does not do so she is unable to hold the urine and she soils her linen. For this reason she does not go to the movies or travel very far from home.

Previous History.—Four years ago the patient had her appendix removed. The appendectomy, needless to state, did her no good. The symptoms, pain in the side, etc., continued just the same after as well as before the operation. Her general condition is good. Appetite is good. She sleeps fairly well except for the frequency. She has lost about 8 pounds in weight. There is no history of tuberculosis or urinary disease in the family.

Physical Examination.—*Head and Neck.*—Negative. There are no palpable cervical glands and no signs of any previous suppurative disease in the glands. The thyroid is a little full.

Chest.—Asymmetric, due to a slight degree of curvature to the right in the midthoracic region, producing a bulging of the tho-

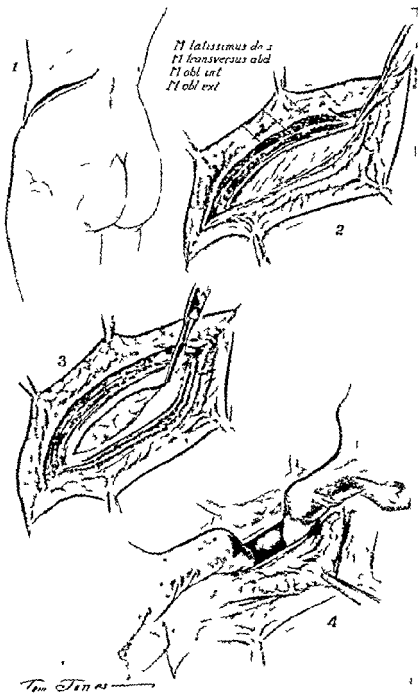


Fig 432

right cavity on the right posterior side Slight dulness over the right infrascapular region Expiratory sound prolonged over right apex anteriorly and posteriorly Breath sounds over rest of lung normal

Abdomen—Liver and spleen negative Both kidneys are easily palpable Right kidney is very sensitive Tenderness over lower part of abdomen, over bladder she is exquisitely sensitive so that one cannot make very much pressure over pubes

Cystoscopic Examination—Bladder capacity, 3 ounces In the apex of bladder were seen several ulcerating tubercles There is a good deal of cystitis in the right half of the bladder while the left half appears fairly normal The left ureteral orifice is normal The right ureter is ulcerated and dilated The bladder around it is red and swollen

Ureteral Catheterization—Left catheter passes all the way up without difficulty or obstruction On the right side the catheter passes up only about 6 cm

Examination of the urine shows the following

1 Cultures

- (a) Bladder—staphylococci
- (b) Right ureter—sterile
- (c) Left ureter—sterile

2 Leukocyte counts

- (a) Bladder, 90
- (b) Right ureter, 60
- (c) Left ureter, 20

3 Examination for tubercle bacilli

Urine from right ureter shows tubercle bacilli No tubercle bacilli in specimen from left ureter

4 Phenolsulphonephthalein test

Time of appearance left, three minutes right, eight minutes

Output right 3 per cent, left, 44 per cent

Fig 432—Tuberculosis of the kidney 1 The usual oblique incision used for exposing the kidney 2 the muscles have been divided and the transversalis fascia exposed 3 the transversalis fascia is divided with a scalpel the perirenal fat shows in the lower part of the wound 4 an incision made in the perirenal fat is enlarged by blunt dissection with the fingers preliminary to delivering the kidney

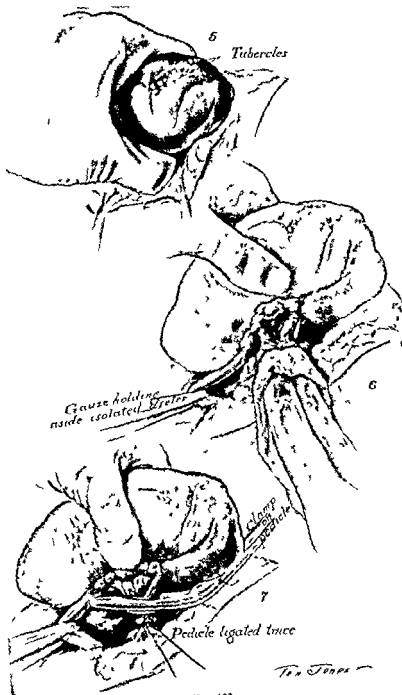


FIG. 433

Examination of the blood shows 12 500 leukocytes, 70 per cent hemoglobin. Blood pressure is 110 systolic and 60 diastolic.

x Ray examination shows the presence of calculus in the right kidney.

Summarizing this evidence, we find that both kidneys are palpable that the right kidney is more tender than the left and that there is suprapubic tenderness. Cystoscopic examination shows tuberculous changes in the bladder, these changes are localized to the right half of the bladder particularly around the right ureteral orifice. Ureteral catheterization demonstrates tubercle bacilli in the urine from the right ureter, whereas the urine from the left is clear and free from organisms. The phenol sulphonephthalein test shows the right kidney to be eliminating 3 per cent and the left 44 per cent.

Our conclusions therefore are as follows. This patient is suffering from a double lesion that is she has tuberculosis of the right kidney and also a stone in the right kidney. We have demonstrated the left kidney to be free from disease. It has about normal function as shown by the thalein test. We have demonstrated that this kidney is doing most if not all the work. Therefore I think we are justified in proceeding to the removal of this right kidney.

Operation—I will make the usual oblique kidney incision parallel with the right lower costal margin (Fig 432 1). I will make this incision very long and carry it down well forward in order that we may get a good exposure of the ureter and in order to remove as much of it as possible. The muscles are divided and the transversalis fascia opened. The perirenal fat is seen (Fig 432, 2 and 3). The fatty capsule of the kidney is split and the kidney delivered into the wound (Fig 432 4). We will first isolate the ureter and separate it from the surrounding connective tissue and fatty tissue (Fig 433 5-7). The ureter is followed downward

Fig 433—Tuberculosis of the kidney. 5 Kidney brought into view a few groups of isolated tubercles are seen on the surface. 6 isolation of the pedicle. The ureter has previously been freed and is retracted by a piece of gauze. The peripelvic fat is removed by blunt dissection with a piece of gauze. 7 after removal of the peripelvic fat the pedicle of the kidney is clamped and doubly ligated proximal to the clamp.

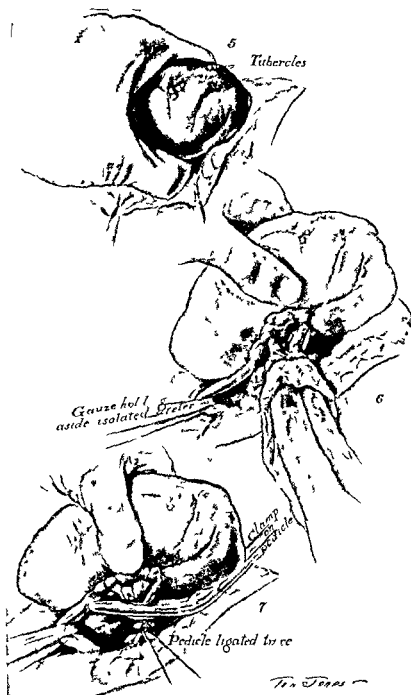


Fig 433

into the pelvis as far as the broad ligament. The ureter is severed with a Paquelin cautery (Fig 434, 8). The renal vessels are severed after ligating them with three ligatures. The perirenal fat is

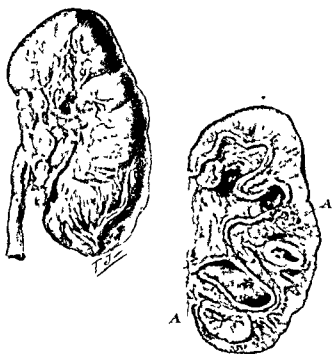


Fig 435—Appearance of external surface and of mesial longitudinal section of diseased kidney. The point of especial interest is the markedly dilated pelvis lined with tuberculous granulations and with associated destruction of renal papillæ. 1 Caseous ulcerating tubercles.

excised after applying a ligature (Fig 434, 9). The wound is packed with a small piece of iodoform gauze and the incision is closed by three layers of sutures (Fig 434, 10).

I shall pass the specimen around for your inspection (Fig. 435).

Fig 434—Tuberculosis of the kidney. 8, Division of ureter with Paquelin cautery. The entire wound cavity has been packed with gauze to prevent contamination by possible leakage from the ureter, 9, removal of the perirenal fat, multiple ligatures are tied at the base of the fat flaps to insure against annoying and possibly dangerous oozing, 10 the wound is closed in layers, leaving space for a cigarette drain at one angle. The first row of stitches close the incision in the transversalis fascia. The rest of the muscles are included in the second layer.

CASE II

The second case I wish to present this morning is that of a female aged forty one

Present Complaint —First pain in bladder region and urethra especially on urination This condition has been present for five months Second backache (lumbosacral) when on her feet or upon slight exertion This has been present for two years Slight cough for one and one half years

Two years ago in April the patient noted a throbbing sensation in the region of the tip of the tenth rib This would come and go and last only for a few minutes It was not very regular in its appearance The backaches would come on after the throbbing pain disappeared Also on exertion she would have a severe aching pain in the left lumbosacral region This backache has never been severe enough to compel her to go to bed although she would be relieved when she would lie down The pain is noticed whenever she is tired out although lately it has not given her much distress

Pain in the Bladder —This came on in January 1917 when she noted pain in the region of the bladder The pain is burning in character and accompanies the act of urination The burning is more marked at the end of urination and is described as a drawing pain

Frequency of Urination —This has been present for one and one half years At first the frequency was not very severe so that the patient was obliged to void every three hours and would arise once at night The frequency has gradually increased in severity so that now she is obliged to urinate every hour during the day and every half to three quarters of an hour during the night

Night sweats —Lately she has not been bothered with night sweats but formerly this was quite a pronounced symptom

Previous Illnesses —Five years ago the patient was operated upon for tuberculosis of the right ankle Following the operation a sinus remained which discharged for three years

Physical Examination —*Head and Neck* —Negative

Chest —Voice transmission at the left side anteriorly is

diminished Right upper lobe is a little dull posteriorly and a few subcrepitant râles are heard posteriorly Heart is negative

Abdomen —Liver is slightly enlarged and extends fully one fingerbreadth below the costal margin There is no bladder tenderness The lower pole of the right kidney is palpable and the left kidney area is tender

Lower Extremities —Slight varicose veins present

Cystoscopic Examination —Two large areas of ulceration are seen behind the ureteral orifices The ulcer which is situated near the left side of the bladder is irregular and covered with a grayish looking slough The margin of the ulcer is hyperemic The left ureteral orifice seems a little edematous after the catheter has been inserted This edema appears to be continuous with the previously described area of ulceration behind the left ureteral orifice The right ureteral orifice is in front of the previously described ulceration and apparently is not connected with it

Ureteral Catheterization —The catheter on the left side passed rapidly into the renal pelvis and a prompt flow of urine was obtained The urine was turbid and contained flakes Catheterization of the right side was difficult Several catheters were used without being able to pass any one more than 4 inches above the bladder The patient was given a slight amount of nitrous oxid gas in order to overcome this apparent obstruction, but without avail

Phenolsulphonephthalein Test —Time of appearance right, six minutes, left, twelve minutes Output right, 2.3 per cent, left, 1.6 per cent

Microscopic examination of urine shows the presence of tubercle bacilli in the specimen obtained from the left ureteral catheter

Roentgen ray examination for the presence of stone is negative

Analysis of blood shows 11,500 leukocytes

If we review the evidence I think one is justified in making a diagnosis of left sided renal tuberculosis based on the following

facts The left kidney is tender The second and most important symptom is that the urine from the left kidney shows on microscopic examination the presence of tubercle bacilli A study of the renal function in this connection is interesting We find that the right or supposedly well kidney excretes the phenol sulphonephthalein in six minutes, whereas the left or pathologic kidney does not eliminate the dye until twelve minutes have elapsed from the time of intravenous injection A study of the total output of phenolsulphonephthalein, however, is somewhat at variance with the usual figures obtained in this class of cases You notice that the right side, which is the well side, eliminates 23 per cent of the dye in one hour, whereas the left or pathologic side eliminates only 16 per cent The total function is 39 per cent This, of course, would lead one to believe that both kidneys are doing a very small amount of work, and that the patient, eliminating only 39 per cent of phenolsulphonephthalein, is in bad condition and perhaps on the verge of uremia Thus, however, is not always true, and this case illustrates very beautifully the fact that the tests employed in determining renal function have certain limitations, just as any laboratory test has that we use in clinical surgery The question might very properly be asked why does this patient have a total output of only 39 per cent? It has been shown repeatedly that instrumentation may at times upset the renal function, so that if a subsequent test is carried out the normal figures are obtained We have repeatedly, in cases of this kind allowed the patient to return to bed and the next morning without any instrumentation repeated the thalein test This invariably has shown figures up to normal and there is one obvious conclusion, namely, that the presence of the catheters or the cystoscope, or both, may inhibit renal function The opposite condition at times may occur, so that patients have polyuria as a result of instrumentation in which great quantities of colorless urine are eliminated within a very short time In order to determine that this patient has a good function a second thalein test was carried out This showed a combined function of 40 per cent, so that we can rest assured the renal function is quite up to normal and that the kidney which

is to remain is capable, as far as we can tell by clinical tests, of carrying out the work of both kidneys

In this instance it is not difficult to demonstrate the presence of another focus of tuberculosis. In this case the lesion that preceded the kidney lesion was an old tuberculous osteomyelitis of the ankle. In addition, we are able to demonstrate evidences of pulmonary disease.

Operation.—Owing to the fact that this patient has some pulmonary findings we will operate on her under gas-oxygen anes-



Fig 436 —Mesial longitudinal section of kidney. Note large caseous tubercles in kidney parenchyma and thickening of wall of pelvis and ureter

thesia. The dissection will be essentially that which you have just seen in the preceding case. Note that I am careful to give myself sufficient room in which to work by means of this liberal incision. I remove the kidney and as much of the ureter as I can conveniently in the usual way. No attempt is made to tie the artery and vein separately, but they are ligated *en masse*. I will remove as much of the perirenal fat as possible, as I believe that it may occasionally be the cause of persistent sinus formation.

Large retractors are now inserted in order to inspect the cavity, looking for bleeding points and possible injury to the peritoneum. Having satisfied myself on these points I will insert a cigarette drain down to the lower end of the wound cavity. I will now proceed to close the wound by closing the muscle layers separately with catgut. The skin I close with fine skin silk.

The specimen presents the typical picture of caseous and ulcerative renal tuberculosis (Fig. 436).

There is still a good deal of discussion as to the best way of treating the ureter and what should be done with the fatty capsule. Most men who operate for renal tuberculosis do not pay any attention to the presence of the perirenal fat. As I have already said I believe that the fatty capsule deserves much more attention and consideration than is usually given it. One finds a great many different expressions of opinion on this subject and until comparatively recently the fatty capsule has been either ignored or sadly neglected. Many of our best text books on surgical technic, genito-urinary surgery, and many of our books on general surgery do not refer to it at all in considering this subject. Just why it should be overlooked for so long a time is not quite clear to me. Many of the more recent writers attribute to it the possibility of being one of the causes of sinus formation after nephrectomy. These men do not believe that all the post-operative fistulae or sinuses are due to the stump of the ureter which is left behind. The clinical evidence of the involvement of the fatty capsule is seen in some of the late cases where at the time of operation the fatty capsule can be recognized as being definitely pathologic since it forms a hard mass like cartilage. There are many men who believe that the fatty capsule is always more or less indurated and adherent to the kidney. These lesions may be purely of a simple inflammatory nature but doubtless in a certain percentage of cases they are tuberculous. That they are tuberculous has been proved in many instances in which the fatty capsule was removed and examined histologically. Tubercles have been demonstrated in cases in which the fatty capsule looked perfectly normal to the naked eye.

Tuberculosis of the fatty capsule may be evident in cases

where tuberculous granulations are seen on the surface of the kidney. Not only are tuberculous changes found in the cases in which the fatty capsule appears unaltered to the naked eye, but they are also found in the cases where the fibrous capsule of the kidney appears perfectly normal. These facts would appear to be rather conclusive arguments in favor of removing the perirenal fat, or as much of it as possible, in the cases of nephrectomy for tuberculosis. There may be exceptions to this rule, however, as in some cases it may be too difficult a problem to remove the fatty capsule without loss of time and danger of shock and hemorrhage. In such instances the fatty capsule must be left behind. This is especially so if the fatty capsule is hard and rigid, in which instance one may assume it has formed a protective wall before operation, and that it will continue to do so afterward. In these cases there may be the additional danger of injury to the peritoneum, with resulting tuberculous or even mixed septic infection of the peritoneal cavity if the capsule is removed. It is easy to see, therefore, that this question of the correct method of treating the fatty capsule is not a closed chapter.

Management of the Ureteral Stump.—The management of the ureteral stump has caused more discussion perhaps than any other phase of the subject, and is one which, up to the present time, has not been satisfactorily settled to all concerned. The many different ways of treating the ureter which have been advocated is ample proof that the ideal method has not been obtained. When nephrectomy was first recommended it was advised to remove more or less completely the entire diseased ureter. The more recent train of thought seems to be to remove only part of the ureter, as much as can be removed through the lumbar incision, and this generally means to the brim of the pelvis. At first it was advised to remove the entire ureter, including the bladder wall around the ureter. This method, however, soon fell into disfavor because it did not fulfil the claims of its advocates, because of the increased mortality rate, and because it did not prevent postoperative fistula. For a time it was advised to suture the ureter to the skin in order to treat the ure-

teral mucosa directly and so prevent infection of the wound with tuberculosis. Others advised suturing the ureteral stump to the muscles. Both of these procedures, I believe, have been given up by the men doing this class of work.

Many procedures have been recommended for the treatment of the ureteral mucosa, cauterization, electrolysis, and injections of carbolic acid have all been advised as well as the injection of tuberculin into the ureter. None appear to have outstanding merit.

Methods of Severing the Ureter—These have also been varied. The ureter may be crushed with heavy forceps and cauterized with carbolic acid. Some prefer to burn through the ureter very slowly with the cautery. Invagination of the cut end of the ureter by purse string suture, somewhat similar to the technic in appendectomy, has been suggested in order to secure a more thorough closure of the cut end, either with preliminary crushing of the ureter or with ligating. Ligation and invagination have been criticized because the end containing the ligature lies in the lumen of the ureter. Occasionally special treatment of the ureter is not necessary. This has been demonstrated by cases in which the ureter was simply cut off and allowed to retract. Personally I never attempt extensive resections of the ureter, being satisfied to remove as much of the ureter as I can through the lumbar wound. Usually I am able to divide the ureter at the pelvic brim and occasionally just below it. As a rule I divide the ureter between heavy forceps. When I divide the ureter with the knife or scissors I always cauterize the end with pure carbolic acid, after having previously placed a ligature below the clamp, and then allow the stump to drop back into the wound. Recently I have been dividing the ureter with the Paquelin cautery. The objection to leaving a stump of the ureter has been that it continues to pour infectious material into the bladder, thereby infecting a clean bladder or delaying healing of an already infected bladder. I think that it will be difficult for any one to say that a stump a few inches longer or shorter will make very much difference. Attempts have been made to modify the technic according to the pathologic conditions

of the ureter If the ureter is thick and increased in circumference because of the thickening of its walls and if its lumen is small, it is a safe procedure, as a general rule, to resect as much as can easily be resected These cases generally heal without fistula formation If, however, the opposite condition is present, in which the ureter is thick and the lumen on cross section dilated, I think it a good plan to carry out as complete a ureterectomy as possible

CASE III

The third case we have this morning is Miss M K, aged seventeen, by occupation a telephone operator, who complains of only three symptoms, namely, painful urination, frequency of urination, and bloody urine

Present Complaint—About eight months ago the patient experienced a burning pain over the bladder during the act of urination This pain did not radiate down the thigh or back, but appeared very definitely localized to the bladder region The pain has been gradually becoming worse, and at present it is intolerable even when she does not urinate, so that the pain now is present during urination and between urinations For the past two months the patient has noticed that she has been obliged to urinate more frequently than before Although this symptom has been noticed for only two months there have been times during the day when she would be obliged to void as often as every ten minutes and at night she would get up five times to void She has remained home for the past three weeks and since then does not have to urinate as frequently, this doubtless being due to the fact that she rests a good deal and is off her feet The urine occasionally has shown the presence of blood, which the patient has been able to see with the naked eye

Family history shows that one brother died of tuberculosis

Physical Examination—General examination shows a well nourished young woman of seventeen who has not lost in weight

Head and Neck—Completely negative

Chest—Lungs are completely negative, as is the heart

Abdomen—Held rather rigid, so that examination is difficult

The right kidney area is tender anteriorly and posteriorly—tender to palpation and also to percussion. There is slight tenderness also over the left kidney. There is no evidence of glandular tuberculosis.

Dr Greer, who referred the patient to us, examined the urine at his office and was able to demonstrate the presence of pus and tubercle bacilli in the mixed urine so that he brings her to us for the purpose of determining the origin of the pus and tubercle bacilli.

Roentgen ray examination for the presence of stone is negative.

Cystoscopic Examination—In the apex of the bladder are seen many small ulcerations. Large flakes of pus are adherent to the bladder wall. The right ureteral orifice is surrounded by a slight hyperemia and behind the right ureteral orifice are seen many tubercles. The left ureteral orifice appears normal.

Phenolsulphonephthalein Test—Time of appearance right five minutes, left, five minutes. Output right 28.5 per cent, left, 19 per cent.

Cultures of the urine obtained from the right and left ureteral catheters and bladder have remained sterile.

Cell Count on Urine—

- (a) Right ureter, 30 per cubic centimeter
- (b) Left ureter, 800 “ “
- (c) Bladder, 350 “ “

This is interesting because in the cystoscopic picture tubercles are seen behind the right ureteral orifice. The ulcerating tubercles that are seen in the apex of the bladder occur not infrequently, and of course, are of no value in aiding one to determine whether the tuberculosis is right or left sided. The presence of tubercles nearer the right ureteral orifice than the left would lead one to believe that the tuberculosis was right sided. This might further more be assumed because the right kidney is palpable. Therefore if one would be hasty in his conclusions and assume that, from the fact that the right kidney was enlarged and painful and tender and the tubercles were nearer the right ureteral orifice, that this patient was suffering from a right sided tuberculosis one would

commit a very grave error inasmuch as one would diagnose a right sided tuberculosis when as a matter of fact ureteral catheterization shows the right urine to be free from tubercle bacilli and the left urine to contain large quantities of tubercle bacilli and large amounts of pus. The phenolsulphonaphthalein test shows a slight impairment of function on the left side.

From the evidence therefore my diagnosis is a left sided renal tuberculosis and I have advised the patient that an early nephrectomy should be carried out.

Operation—Gas ether anesthesia will be used since the lungs as far as we can determine are free from active tuberculosis at this time. We will make our usual oblique posterior lateral incision beginning one fingerbreadth below the last rib and carrying it well forward. The muscles are divided in the usual way and separated by traction with the fingers. The perirenal fat comes into view. The fatty capsule is picked up between two curved hemostats, nicked with a dissecting scissors and opened. With my hand I have no difficulty in freeing the kidney and delivering the kidney into the wound. The kidney after the fat has been removed with gauze appears to be perfectly normal. There are no external evidences of tuberculosis. The lower pole seems however to be somewhat larger than the upper. When it is examined a little closer we see that it is smooth and enlarged and has a different color from the rest of the kidney. This does not look like tuberculosis and has the general appearance of a large urinary cyst so that by looking at this kidney one would believe we had made an error in our diagnosis as there is no evidence on the surface of the kidney of tuberculosis. This cyst which you see in the lower pole of course is not in any way responsible for the presence of the symptoms which she complains of and is purely an accidental finding. Having cystoscoped this patient twice and having twice demonstrated tubercle bacilli in the urine from the left kidney we may feel assured that we are dealing with tuberculosis of the kidney and we are going to remove this kidney irrespective of the fact that there are no appearances of renal tuberculosis.

As I dissect and remove this fat working my way toward

the renal pelvis I can feel that the ureter is very thick and very hard so that this patient has a tuberculous ureter which further more proves that this is the correct kidney to remove I shall

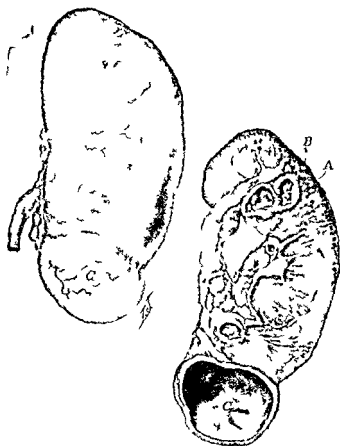


Fig 437 —Kidney with urinary cyst in lower pole (C) The capsule is smooth and presents no evidence of tuberculous. On the cut surface however are found numerous small tubercles (B) and one large focus of ulcerated tuberculous.

dissect the ureter from its bed with gauze as far forward as the brim of the pelvis

NOTE —The dissection was continued and the kidney with a portion of the ureter and most of the perirenal fat was removed as in the previous case. A cigarette drain was carried down

to the stump and the wound closed in the usual manner in layers, the muscles with catgut, and the skin with silkworm-gut and skin silk.

On cutting into the kidney which I have removed we find abundant confirmation of our clinical diagnosis. Here, in the upper pole, are numerous miliary tubercles surrounding an area of ulcerative tuberculosis. The enlargement at the lower pole is, as we suspected, merely a urinary cyst and bears no relation to the active pathologic process for which we operated (Fig. 437).

CLINIC OF DR. LOUIS E. SCHMIDT

ALEXIAN BROTHERS HOSPITAL

A DEMONSTRATION AND DISCUSSION OF THE TECHNIC OF PROSTATECTOMY

(Given Before the Members of the American Urological Association,
April 3d and 4th, 1917)

Summary Discussion of the results obtained and presentation of the conclusions reached after a quarter of a century's intensive experience with prostatectomy, advantages of the suprapubic route—when the perineal route may be desirable, pre-operative care—points to be observed—methods of examination, choice of anesthetic—local infiltration for cystotomy and a gas oxygen ether mixture for enucleation best answer the indications, operative technic—dangers of unnecessary traumatism—how to prevent the formation of dead spaces—the two-step operation—control of hemorrhage—finger pressure, the Hagner bag, the Pilcher bag, the gauze pack, suture and fat transplantation, postoperative treatment

At the outset I wish to state that I have nothing new to offer in connection with this operation, I have had experience for over twenty years with prostatic operations of all kinds, which will at least permit me to outline the different points of interest in connection with these 5 cases which I will operate on, and also to mention the various details of the procedures which I consider essential to the success of this operation.

At this time I will not discuss the advantages and disadvantages of the suprapubic and perineal operations. These are well understood and there are few differences of opinion. As far as I am concerned there are but comparatively few instances at the present time which are desirable to operate from the perineal route. The cases which have necessitated me to operate from below have been the small hard prostate, the prostate complicated with a fine stricture of the urethra, the prostate complicated

with some form of abscess, prostatic or perineal in character, or a peri urethritis or if it is essential to attack the seminal vesicles, which can easily be carried out at the same time. Occasionally there are instances where perineal drainage may be more desirable than suprapubic and then if the necessary relief is obtained, the second step can also be carried out through the perineal route.

Nor do I wish to outline the indications for prostatectomy, as there still is room for discussion. But in a general way indications are more easily advanced now, considering the results obtained by operation and comparing the results of bygone days when palliative treatment was carried out to the extreme limit. I believe it is true that if there were no mortality in connection with this operation all would easily agree on the indications.

In order to avoid unnecessary mortality it is well agreed that the patient should be put into the best condition possible before operation. There are but few instances where patients need immediate operative interference. Then only a drainage operation is carried out. This is done to allow the patients to recuperate and get into a physical condition which will permit the removal of the prostate without any unusual risk.

It is well never to hurry unless the indications are imperative. In all instances during the period of observation a careful differential examination is to be considered. Simply because more or less typical symptoms are present one must not forget that cancer of the prostate, seminal vesicles and contracture of the neck of the bladder can give rise to practically similar cardinal symptoms as those of enlarged prostate.

Pre-operative Care—There is no question whatsoever that pre-operative care and attention is as necessary for satisfactory results in this class of work as detailed postoperative care. For that reason I can urge every one to give as much care to the patient before as after the operation. This pre-operative care varies with different cases as I shall demonstrate later. During the pre-operative period the surgeon is given the opportunity to make all the desired functional tests as well as to keep the patient under the necessary observation in order to become familiar with his condition, so that in case of accident or com

plication following operation better judgment can be used in the treatment.

The average care of the patient in those cases where no catheterization is necessary for the relief of retention should simply consist in keeping the functions of the patient active. Laxatives should be given freely, not sufficient, however, to irritate the intestines. The bowel movements must be free. Two and three nights before operation castor oil should be given. Warm baths sufficient to put the patient in a light perspiration are advised daily. Large quantities of fluid should be taken. I believe it is not desirable to give any diuretic drug unless absolutely necessary. If the quantity of urine before beginning the pre-operative care is below normal the quantity of fluid intake naturally should be increased until the patient secretes 2000 to 3000 c.c. in twenty-four hours. Urinary antiseptics should be prescribed. A certain amount of attention to the diet is desirable. However, as a rule, people operated upon for this condition have their set ways, and it is not particularly desirable to change their diet to any extent, yet no unnecessary amount of raw fruit, salads, or highly spiced foods or stimulants should be permitted.

During this period of time the ordinary functional tests should be carried out. The phenolsulphonephthalein test is the one of choice with most surgeons. However, I also have always added, and have had no reason to regret it, examination of the blood by cryoscopy. These two tests are easily carried out and certainly, in the light of our present-day knowledge, cannot be objectionable, although, of course, there is a question as to their value. In my opinion, however, these functional tests, considered in the light of the urinary findings by the usual method of examination—the total excretion for twenty-four hours, the total solids, the total nitrogen, urea, and other elements—add information the value of which cannot be disputed. Within the last few years, of course, the estimation of the urea, uric acid, creatinin, and total nitrogen of the blood have been introduced, and from personal experience and from the observations of others there is no doubt in my mind that definite information as to the powers of excretion of the kidney can be estimated. These blood examina-

tions are most accurate and I am inclined to believe should be seriously considered by every operator previous to undertaking operations particularly on the aged. In addition to the detailed examination of the urinary apparatus the period of pre operative observation also affords opportunity for making the ordinary blood examination to observe the temperature the blood pressure and to cystoscope in order to acquaint oneself with the interior of the bladder. \times Ray examinations of the genito urinary tract are always made as a routine practice.

The question of cystoscopy always comes up. I can particularly urge this mode of examination in every instance provided it is carried out with every care as far as asepsis is concerned. If cystoscopy is carried out so as to cause traumatism and great pain to the individual it is not unusual to cause slight complications that will necessitate attention. By cystoscopy one can find out the presence or absence of stone or tumor two of the most common lesions which are encountered with large prostates besides the attending complications such as infection of the higher urinary tract or local conditions which might also have something to do with the success of the operation. I have particular reference to diverticuli of the bladder. In those cases where the urine is sterile and where no catheters have ever been passed I as a rule give the bladders several days of treatment with urotropin by mouth before examining with the cystoscope.

There is another class of cases which is of importance particularly from the standpoint of pre operative care. I have reference to those cases in which there is an enormous quantity of urine passed—often 7000 to 10 000 c c in twenty four hours. There is frequently retention in these cases and the urine is sterile. Catheterization soon becomes necessary and if kept up which it must be unless contraindications are present infection always takes place. These cases in addition to the case mentioned always demand the two step operation and the interval between the first and second steps should be sufficiently long. I can safely say the longer the better.

The patients with chronic retention of urine who have been

catheterized and who have either sterile or infected urine should receive the foregoing attention as well as the regular catheterization. The number of times of catheterization per day should depend on the quantity of retention. Four ounces or less should be catheterized at least once a day. Eight ounces or over should be catheterized fully twice a day, and in those instances where the patient has a still larger quantity of retention than the amount mentioned he should be catheterized three times a day or oftener as the case demands. If the bladder is infected there is no objection to irrigating with almost any of the various irrigating fluids.

In these instances, therefore, as well as in those cases that are receiving the pre operative care to the full extent, the patients are ready for the first step of the two step operation

Anesthetics —The question of anesthetics is undoubtedly one of the greatest importance From time to time various operators report the wonderful results they have had working with a particular anesthetic, and have practically given the credit to the anesthetic Operators differ as to their point of view in regard to anesthetics I might say they differ as much on this question as on the question of what method to use in operating on these prostatics

I witnessed the beginning of the era of prostatectomy I have noted the advantages in the various steps and procedures of this operation I have also seen the various methods of anesthetizing the parts locally, as well as those of administering a general anesthetic I have had the opportunity to see others work and to try out personally a large number of cases under every method of anesthesia, and for that reason I wish to express my opinion on this most important question

I wish to state most emphatically that, after having seen the complications that may arise from the use of the various anesthetics whether local or general I have come to the positive conclusion, first, that the anesthetic should be given by an expert, and second, that local anesthesia for the first step and gas oxygen ether for the second answer completely the necessities of the *general run of cases* It is true that gas anesthesia has its objections in the aged and that it has distinct contraindications These, of course must be observed I have discarded every other anesthetic, except chloroform in some instances in all of the second steps of the two step operation or where I do a prostatectomy in one step Naturally, in the first step of the two step operation a local anesthesia is all that is necessary I am under the impression that there are practically no objections to this method of anesthesia There may be instances where it is not sufficient Then it may be considered desirable to use a general anesthetic, and if so such a one as aforementioned would be indicated The local anesthetic which I use is the ordinary

Schleich's solution The cocain in the Schleich's solution, of course, may be considered objectionable, but I have had no detrimental results with it

Anesthesia by nerve-blocking methods has been advocated and practised by numerous operators, but in my opinion the complications and accidents resulting from their use have exceeded in frequency and importance those which may arise from the use of the anesthetic which I consider the anesthetic of choice For instance, take spinal anesthesia It is perfectly true that total anesthesia of the abdominal wall, bladder, and prostate can be obtained, and the latter can be removed without pain, but considering the condition into which the patient is put, the length of time that is required for him to again get into his normal condition, the anuria that may occur and the pulmonary and cardiac complications that may arise—why use this anesthetic? The complications common to all anesthetics may occur here, and even such a local complication as injury to the coverings of the cord or to the cord itself have been reported There are those who believe in the possibilities of anesthetizing the pelvis by the sacral method and have constantly urged this procedure as the one method which has its advantages over all others I can only state that this procedure, even in the hands of those men with the greatest experience does not give complete anesthesia in much more than a majority of the cases Its adherents claim 85 to 95 per cent of successful anesthesia By this method of inducing anesthesia where the abdominal wall does not become anesthetized the ordinary infiltration method, in addition, is always necessary in order to enter the bladder In a large number of cases that I have seen where this method has been used the patient has had sufficient pain to necessitate the operator's resorting to a general anesthetic Not only that, but here, as is the case with spinal anesthesia, local complications are not uncommon I know of several instances where pain apparently along the sciatic nerve has persisted with such intensity that only morphin has been able to give relief I know of many instances where the anesthetic was not sufficient to permit the beginning nor the completion of the operation, and a general anesthetic was also necessary

It is out of the question for me to go into the minor technical details regarding the administration of both the local and general anesthetics that I have referred to, and also with regard to the scopolamin-morphin anesthesia which was popular years ago. Furthermore, I do not wish to discuss the advantages or disadvantages of these various methods at this time, but simply to impress on those who are here today my opinion as to their relative

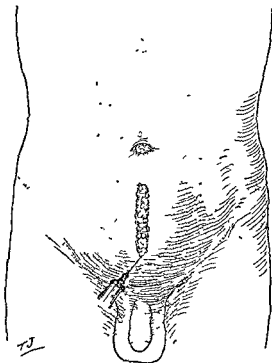


Fig 438—Infiltration of skin with Schleich's solution. The area infiltrated may include the distance from the umbilicus to the pubic fold, depending on the length of the incision to be made and also on whether a high or a low incision is planned.

utility. For the past few years I have limited my anesthetics as has been mentioned, that is, Schleich's solution for opening the bladder and gas-oxygen ether for the enucleation of the prostate. Occasionally one will meet with highly neurotic individuals who object to a local anesthetic. For these people the gas-oxygen-ether combination is entirely sufficient.

Technic of the Operation.—As you will see by Fig 438, I infiltrate carefully the median line from some distance above the pubis to within a short distance of the umbilicus (Fig. 439). Not only the skin, but the subcutaneous tissue, the superficial

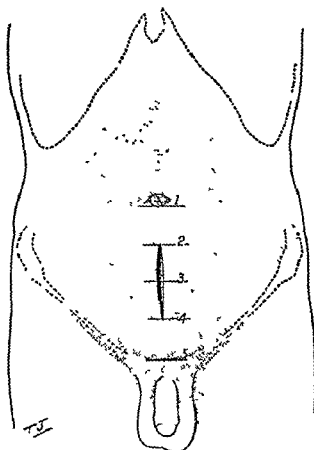


Fig 439—Diagram illustrating the proper length and location of the skin incision. When the bladder can be distended with 250 c.c. or more of fluid, an incision from 2 to 4 is desirable. If it is impossible to distend the bladder, an incision from 3 to 5 will be more serviceable. Incisions extending below 5 are unnecessary and often detrimental. The high incision is preferable, as the healing is more satisfactory, the immediate connection with the pubic arch being left undisturbed. Here also the bladder is much more easily attached to the abdominal wall.

fascia, and the fat immediately below are infiltrated. I then incise to the fascia. I do not undermine either the upper or lower angle of the incision, nor do I separate the fat from the fascia on either side. If there are any small vessels that are bleeding,

crushing or, occasionally, tying off is desirable. Then the fascia is infiltrated (Fig 440). By the introduction of the needle through the fascia directly into the muscle further infiltration is carried out. Then the incision is made through the fascia and the depressed muscle fibers are exposed and separated without undue traumatism so that the prevesical fat can be seen. It is just at this point that I wish to emphasize the fact that it is

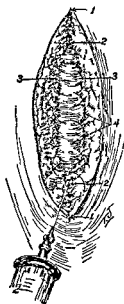


Fig 440—1 1 represents skin incision 2 2 shows incision of fat—not as long as skin incision 3 3 fat pushed aside without loosening from fascia on either side 4 wheals produced by infiltrating the fascia. The fascia is then split and the muscle infiltrated in the same manner after which the muscle-fibers are carefully separated

poor policy to push and pull the overlying thin fascia which is attached to the bladder in all directions. It is my practice to permit it to remain *in situ*. I then proceed to the infiltration of this fat (Fig 441). I make an incision through the fat to the bladder all the time not disturbing the fat and the tissues that lie between the bladder and the pubes. The bladder then comes into view and the fat is pushed aside so that if there are any dilated and tortuous blood vessels which frequently are not un

common, they can be readily seen. These vessels can easily be tied off (Figs. 442 and 443) at various points, so that there will be no hemorrhage when the incision is made into the bladder or if the vessels are otherwise injured. I make it a rule to distend the bladder. After the bladder has been thoroughly irrigated, if it is indicated to fill it at the time of preparation for operation,

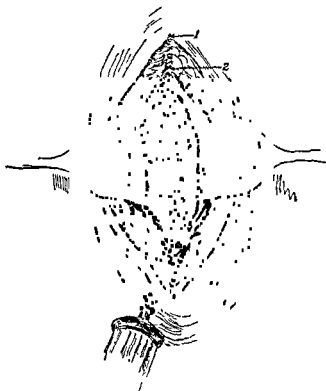


Fig. 441.—The muscle has been incised and the fibers are being separated by tractors, exposing the prevesical fat, the skin, fat, and fascia (1, 2, 3) are not separated from each other except at the line of incision. Observance of this precaution obviates the formation of pockets where infectious material may lodge. This sketch further shows the infiltration of the prevesical fat preparatory to incising it and exposing the bladder.

I distend the bladder with 250 to 350 c.c., sometimes more, of boric acid solution or sterile water. I only distend the bladder at this time in those cases that are tolerant. That includes most of the cases that have had chronic retention and the bladder is not irritable. In those cases where catheterization is painful and where the bladder is not easily distended, I distend the blad-

der at this point, that is, where the incision is just coming down to the prevesical fat, because if the bladder is distended with 250 c. c. at this stage, even though it is occasionally very uncomfortable to the patient, the duration of the distention will be so short that the transient discomfort may be ignored. In these cases I also at the time of preparation introduce a $\frac{1}{4}$ -grain morphin suppository into the rectum. As a rule I do not attempt to anesthetize the interior of the bladder.



Fig. 442 —The prevesical fat has been incised and partly pushed aside, bringing the bladder and its radiating vessels into view. 1, The peritoneal fold pushed upward, 2, infiltration wheals in bladder wall.

I failed to mention the preparation of the skin. The ordinary bath and cleanliness are given to the patient the night before operation and sterile dressings applied. After the bladder has been thoroughly irrigated and distended, the skin is washed with alcohol-ether solution and several coats of 4 per cent. iodin solution are painted on the surface.

Regardless of whether the bladder has been distended previous to the commencement of the operation or is distended at the stage in the operation at which I am now, my next step is the

infiltration of the bladder wall, which may be done very quickly. When the bladder is distended with 250 or 350 c.c., its vertex is brought up to within a few fingerbreadths of the umbilicus. In some instances, if the bladder is not distended to this extent, the peritoneal fold may be close to the pubes. If this is the case, it naturally becomes necessary to push the properitoneal fat up-



Fig 443 —Any length incision into bladder can be made with an exposure of this kind. As long as there has been no unnecessary traumatism, no "guy rope" sutures need be introduced into the bladder, as all the different layers through which the incision has been carried remain attached to each other. Note vessel tied off with catgut.

ward, and this can be done easily without producing any pain. The prevesical fat and bladder have been infiltrated. At this time a retractor can be placed at the upper angle of the incision to keep the peritoneal fold from interference, because it is possible to open the bladder as high up as possible, and sufficient away from this fold to insure against injury to it. This is done in order not to disturb the prevesical fat or the parts of the

direct connection with the pubes. If there is no objection, I frequently put in the so-called guy ropes (Fig 444) on either side of the median line and as high up as the peritoneal fold will permit. If no fluid escapes, cutting needles are passed through the muscle, fat, and skin and a pair of forceps attached to the threads, thus holding the guy ropes taut. If fluid escapes from the bladder, I only place them through the bladder and hold them

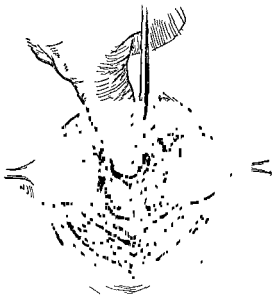


Fig 444—Proper method of incising bladder wall, using index finger for tractor and as a guide. Whenever making a small incision or only a stab wound into the bladder the index finger should be introduced through the incision before withdrawing the scalpel.

taut with the forceps. Then I take a scalpel with the blade pointing toward the pubes and make a sudden thrust and enter the bladder. Then with the index-finger (Fig 444) of the right or left hand I follow the side of the scalpel and introduce the finger into the bladder. This step should be done with accurate knowledge of the anatomic conditions present, and when so carried out it affords a safe method of entering the bladder neatly and quickly. The scalpel is withdrawn, and with the index-

finger pulling upward and forward and holding the bladder in view the guy ropes can be laid aside and the bladder explored for stones or tumors, for the exact contour of the prostate, or the presence of diverticuli. If a previous cystoscopy has been made, this exploration with the index-finger is not necessary. The water which escapes can be swabbed up so as to preserve the neatness of the operative field. If there has been a marked infection of the bladder or if one is present at the time of operation, I in-



Fig. 445.—Bladder exposed, showing trocar being introduced in order to withdraw infected urine with the minimum risk of contaminating the wound. This illustration, as well as the previous ones, attempts to show that all layers of tissue remain in contact with each other except at line of incision. The more carefully this technical point is observed, the less the general reaction following operation and the more rapid and perfect is wound healing.

roduce a trocar into the bladder (Fig. 445) instead of a scalpel, and empty it in this way so as not to permit the wound to become thoroughly saturated with the infected fluid. It has been advised to distend the bladder with air, but I have not been in the habit of so doing, as I find no particular advantage in the method. Whenever doing the operation of prostatectomy in one step, the bladder can be more thoroughly exposed if an incision of considerable length is made in preference to single puncture (Fig. 443).

Here vessels are tied off at convenience and their ligation is a sound precautionary measure.

After the bladder has been emptied I pass a needle which is threaded to the guy ropes through the fascia and skin, practically up to the upper angle of the incision on both sides. This is done in order to make the second step of the two-step operation more safe from entering the peritoneal cavity by hitching the bladder as high up as possible and preventing the peritoneal fold from coming down over the bladder, thus permitting you to enlarge the opening of the bladder downward without necessarily de-

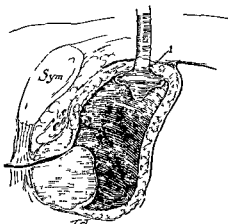


Fig 446—Pezzer catheter in position. This diagram shows the bladder at the first step of the two-step operation.

taching the bladder from the abdominal wall in the second operation. Now if the opening in the bladder is not large, I simply introduce in the first step of the two-step operation a Pezzet catheter (Fig. 446), and if there is no bleeding from the bladder wall oftentimes I do not find it necessary to introduce sutures to control the hemorrhage or to make the opening small enough to retain the catheter. In other instances, if the opening has been of some size, it may be necessary to introduce a suture above and below the catheter so that the catheter will be retained, and also at the same time to stop any hemorrhage from

the bladder wall. If the bladder is drawn up to the upper angle of the incision it is not necessary to suture the fascia at this point. Occasionally, however, the fascia may be opened to a point higher than that to which the bladder may wisely be pulled. Then one or two sutures to close the fascia to the bladder may be necessary.

In this first step of the two-step operation the incision oftentimes, even in very stout individuals, is less than 2 inches in length. Therefore it may not be necessary even to suture the fascia at the lower angle. The skin with underlying fascia is brought together with silkworm-gut sutures. A little gauze dressing is placed over the wound with a tube protruding through the center and the gauze is covered with adhesive plaster. No further dressing is necessary. The patient is returned to bed.

I always advise the use of external heat, that the patient be wrapped up well when transported from operating room to his bed, and that hot liquids be given by mouth as soon as possible. If there is any discomfort, a hypodermic injection of morphin is given. I do not touch the dressings for two or three days, nor is the patient irrigated. On the fourth or fifth day the dressing is, as a rule, removed, and if a little gauze drain has been placed above and below the tube, this too is removed. If the dressings are stained on the second day, they are removed. The patient, as a rule, is up in a wheel-chair not later than the third day. On the fourth or fifth day the guy ropes are removed and the bladder is irrigated. In the course of eight or nine days the skin sutures are removed, and in most instances the wound is found to be thoroughly granulated around the catheter. Occasionally in infected cases the wound is gaping, and, if so, particular attention is given to it.

Now the question comes up as to how long a period should elapse between the first and second steps of the operation. Right at this point I want to say that the two-step operation is becoming more or less preferred by a considerable number of experienced men. I recall, however, in a personal conversation with Freyér in 1906 that he made the statement that he rarely ever considered a two-step operation desirable, and ordinarily saw no choice except in those cases where the patient was practically

moribund I might say that this was the general consensus of opinion at that time I know that I rarely ever did a two step operation in those days except in those cases where it was considered that the patient had practically no chance for recovery or where it was necessary to give him immediate relief I believe with Lihenthal, of New York, who was really its first advocate in America, that the two step operation should be advised in practically all cases I was rather slow in convincing myself of the necessity of this However, my experience in the past three years when studied in comparison to that of previous years induces me to make the statement that there are but few instances in which I do not consider the two step operation the one of choice To some extent I argue that if it is a desirable procedure for those who are seriously sick I can see no objection to its being carried out with those who are in the best of condition It certainly shortens the time required for convalescence from the second operation The operation is divided into two parts, so that the shock that accompanies it is far less than when it is carried out in one step We take advantage of this interval between the first and second steps to keep the patient's functions active and to make whatever observations are desirable The phenolsulphonephthalein test and cryoscopy and all other examinations, already referred to can be made use of as often as the individual case may require From personal observation I can urge operators not to do these second steps too quickly In those instances where the individual is in exceptionally good condition I never operate within ten to fourteen days In those cases where the individual requires time to recuperate or where there is some cardiovascular or renal condition, or both, or even a pulmonary condition that demands attention, I have frequently permitted a period of three months to elapse Naturally, during this time the patient should receive proper care in order to put him into the best of condition for the procedure which is to follow It is not necessary to keep the patient in the hospital for the entire length of time during this period Naturally, it is a matter of convenience to the surgeon I have had occasion, however, to let the patient go home, and, if he came from a distance, to have

the local physician see to it that the functions were kept active and the patient allowed to recuperate so as to gain the necessary strength and resistance for the next step of the operation. During such an interval the patient may be allowed the greatest freedom with regard to getting out-of-doors into the fresh air and sunshine, or he may be permitted to attend to business affairs. During this interval the Pezzer catheter may be removed as often as is necessary in order to keep the bladder and wound from becoming irritable and free from infection. In some instances the urine has a tendency to put deposits on the catheter, and to these patients I frequently give dilute hydrochloric acid daily, which I am inclined to believe has been of some benefit.

The second step of my operation is done under a general anesthetic using a gas-oxygen-ether mixture. The anesthetic is administered in the operating room, and as soon as the patient is under, I introduce a grooved director into the fistulous tract and then a scalpel along the curve of the grooved director, passing downward and incising all the overlying structures from the skin to the bladder. Then I immediately, without withdrawing the grooved director, pass the index-finger of my left hand into the viscus, and, holding the bladder upward and forward with this finger, incise the skin through to the fat, fascia, and muscle, along the line of the previous incision, finding it occasionally necessary to increase the length of incision in order to carry out the enucleation. Then, in order to be positive that the peritoneal fold has not come down, I carefully incise the bladder to such an extent that one can introduce two fingers of his right hand, at the same time withdrawing the index-finger of the left hand from the bladder. There is no objection, previous to the commencement of the enucleation, to again make a digital examination of the bladder. With the index-finger of the gloved right hand the enucleation is started. As a rule I introduce the index-finger as far back in the prostatic urethra as is possible, and with a little pressure motion from side to side the mucosa is easily detached and the line of cleavage found (*Fig. 447*). This can readily be distinguished by the ease with which the finger separates the prostate from the fascia in the line of cleavage. I

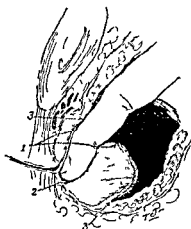


Fig 447 —Enucleation of prostate 1, Rent in mucosa and finger pushing in line of cleavage, 2, angle of urethra and apex of prostate at beginning of membranous urethra It is at this point that extreme care should be given to remain in line of least resistance— ϵ , cleavage In this illustration the larger portion of the prostate is in the bladder— ϵ , within the internal sphincter (2 and 3)—where enucleation can be carried out with ease



Fig 448 —Enucleation of prostate 1 Rent in mucosa and finger again following line of cleavage, but in a direction opposite to that shown in Fig 447 This portion of the enucleation is carried out with ease, as the mucosa is only lightly adherent to the prostate When the finger meets the portion already loosened at 2, it is easy to finish the enucleation, as the only requirement is to keep in line of cleavage Naturally, this brings one over to the so-called anterior lobe Oftentimes the entire prostate may be shelled out by simply continuing the finger dissection in the line of cleavage over the urethra and about the opposite lobe

make an attempt, and, as a rule, succeed, to enucleate the apex of the prostate first on one (the superior) side by swinging the finger around forward as far as possible and then the apex of the opposite (inferior) side (Fig. 448) If it is impossible for me to swing my finger completely around I withdraw the index-finger and the next finger of my right hand, and introduce the corresponding fingers of the left hand at this point, thus permitting me to circle the complete area. The enucleation of the rest of

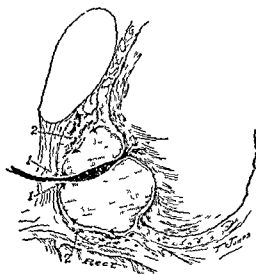


Fig 449 —Diagram illustrating the direction in which the cleavage should be followed If these angles are first attacked, 1-1, the prostate can be pushed forward and upward—not downward and backward—and so we may obviate the necessity of putting two fingers of opposite hand in the rectum It is this technic which in my opinion has overcome the former terrible results of prostatectomy The greatest amount of injury is always produced at this point, for the rest of the enucleation is done without any effort 2, 2 are plexi of vessels, and if a tear extends through the fascia to these, hemorrhage and infection are to be expected

the prostate is a matter of ease. It is my opinion that the crucial point is to commence the enucleation at the right location and to continue the enucleation until this apex portion of the prostate is separated (Fig 449), because once in the line of cleavage and when this portion of the operation is successfully done the line of cleavage cannot be missed, the enucleation proceeds with the greatest of ease, for the simple reason that there is no semi-attachment of the mucosa to the prostate or of the prostate to the

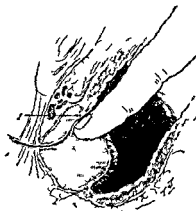


Fig 450—Enucleation of prostate From 1 to 2 the diameter of the prostate is greater than at any other point These prostates are easily removed after having been loosened from their beds (Compare Fig 451)

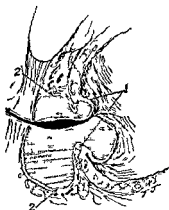


Fig 451—Enucleation of prostate 1 The internal sphincter 2 2 the greatest diameter of the prostate These cases are difficult of enucleation in the manner described because if more than one finger is used the sphincter is put on the stretch or even torn and temporary or even permanent incontinence may result Also contractures of the internal urethral orifice may follow if infection occurs This illustration may be considered as exaggerated but the type is frequently met with These are the ones fraught not only with the complications mentioned but in which also the enucleation is difficult

fascia as at the apex of the prostate or to the urethra and membranous urethra If the prostate (Fig 450) is of such a character that the internal sphincter does not produce a zone of con

traction at any point, it is easily removed without undue trauma. In some instances (Fig. 451) I have lost considerable time in removing the prostate because the contraction of the internal sphincter was of such intensity that it was not easy to introduce two fingers or sometimes even one finger into the urethra and enucleate the prostate as outlined. Sometimes the constriction is so tightly drawn that the body of the prostate can scarcely be brought through this constricted area even with the aid of forceps,

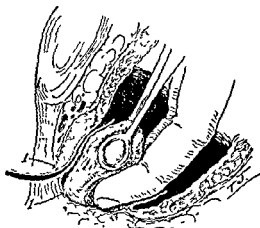


Fig. 452.—Enucleation of prostate. On account of the difficulty of the enucleation at the apex in cases of this type, forceps are used to grasp the portion of the prostate already loosened, and by pressure and slight tension to elongate the prostate and so make it possible for the finger-tips to remain in the line of cleavage. It is an infallible rule never to pull and twist and so tear the prostate from its bed. The finger should always remain in line of cleavage and loosen every portion of the prostate. Those that do not follow this rule are those that most often must resort to methods for the stopping of hemorrhage. Besides, I personally believe that if this rule is not followed, it is just these cases that suffer from shock and hemorrhage, and are then so commonly followed by death.

and in these instances it becomes necessary to remove the prostate (Fig. 452) in two or more portions.

The question of hemorrhage is undoubtedly one of the greatest importance in these old people. Therefore a careful enucleation without traumatism is the one thing in my mind which makes the operation one of comparative safety. In the enucleation I assume the eye of the individual is on the tip of the index-finger, and if one enucleates under direct sight, unnecessary traumatism is not produced. Personally, I rarely ever have used the fingers

of the opposite hand in the rectum in order to steady the prostate I believe that if one uses such an amount of effort that it becomes a necessity to steady the prostate with the fingers of the opposite hand while doing the enucleation one is not sufficiently familiar with the anatomic relationship of the parts to undertake the operation in the first place. If the enucleation is commenced in the way I have outlined this help of the fingers of the opposite hand is not necessary in my experience but is even detrimental. There is no objection I might say to starting the enucleation in any portion of the prostate that protrudes into the bladder. The various methods that have been shown from time to time of where to start the enucleation going through the mucosa over either of the protruding lobes or in a semicircular line are unnecessary. The chief point is not to injure the sphincter at the point where it surrounds the prostate. It is a good omen after enucleation showing that there has been no traumatism to the sphincter if the sphincter contracts down so that practically only a dimple is seen. If this occurs after one has removed a large prostate where there has been a constriction as already mentioned it is positive evidence that there has been no injury to the sphincter. These individuals quickly recover the power of urinating. If the enucleation has thus been carried out and there are no fibers of muscular tissue from the bladder *adherent to the prostate one need not have any great fear of a severe hemorrhage from this portion*. If the prostate shows no evidence of muscular tissue there can be no hemorrhage from the vessels supplying the muscular tissue of the bladder. Occasionally there are varicosities in the mucosa at this point and *these are occasionally torn in the course of enucleation and may produce hemorrhage*. However as already stated if the sphincter has not been injured it is active and naturally tends to check any hemorrhage that may come from these varicosities. If the prostate shows *tip like or string like attachments at the apex which represents that portion of the prostate adjoining the membranous urethra* it means that there may have been considerable traumatism to the tip of the urethra and from this point hemorrhages of considerable severity are known to take

place. Furthermore, hemorrhages will occur if one gets outside of the line of cleavage and tears through the fascia, traumatizing the vesicorectal and other plexi. This accident should never occur, and if it does, though no pronounced infection is present at the time, it becomes, as a rule, a source of chronic sepsis. Occasionally recovery in prolonged convalescence results, but it oftentimes leads to death.

In the management of hemorrhage there have been various procedures advised. It is desirable if possible to ascertain the source of the hemorrhage. If it is from the musculature at the

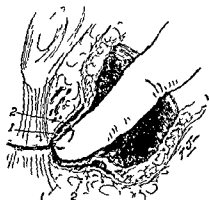


Fig 453—Enucleation of prostate. Methods of controlling hemorrhage. If hemorrhages take place from within or adjoining the cavity, the mucosa (2-2) is pushed so as to cover the raw surface (1-1). Simple pressure with finger or gauze may stop slight hemorrhage. Before making such pressure sterile water at a temperature of 115° to 120° F will often be of great help. Freyer even advised counter-pressure with two fingers in the rectum against the finger, shown in the illustration.

point of the internal sphincter or from the varicosities just referred to, purse-string sutures that do not make a closure of the internal urethral orifice have been advised, or individual interrupted sutures at various points deemed necessary will frequently stop a severe hemorrhage. Hemorrhages that occur from any point within the sphincter may be controlled by finger pressure (Fig. 453), but are probably best controlled either by packing with gauze or by any one of the bags that have been advised. As this is an important question I think it desirable to show how the Hagner bag is introduced and made effective. A catheter is introduced through the urethra into the bladder and

the rubber tubing of the bag is then drawn through the urethra, and to it is attached a syringe which is filled with water. The bag is then gradually drawn into the cavity so that the edges of the bladder are held in place. The rubber tubing is drawn tightly downward so that the water cannot escape. Sufficient water is then introduced into the bulb so as to distend and exert pressure, and the tubing is held in place with bands of adhesive plaster that are placed around the thigh. The Pilcher bag (Fig 454), which is a modification of the Hagner bag, is introduced into

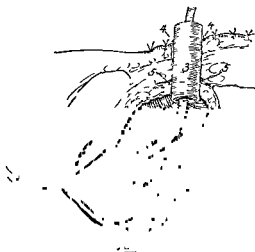


Fig 454—Enucleation of the prostate. Methods of controlling hemorrhage. The Pilcher bag in place, 1 represents the catheter permitting drainage, 2, tubing used to inflate the bag, 3, drainage tube through which inflation tube is drawn.

the cavity in the same way. However, this bag is distended through a small rubber tubing which passes outward through the suprapubic opening instead of through the urethra. The degree of distention to which the bag is subjected is governed by the facility with which the hemorrhage is controlled. It may be necessary to distend it to the maximum capacity of the bladder.

One of the best methods of packing the cavity is as Cabot has suggested. A catheter (Fig 455) is introduced through the urethra into the bladder and a gauze strip 5 yards long, or longer, is drawn through the wound and tightly attached to the

bladder end of the catheter and the catheter withdrawn. The string protrudes from the urethral orifice, and not only is the gauze packed into the cavity where the prostate was, but the mucous membrane is also introduced into the cavity, so that it forms a vesical-shaped opening. The gauze is introduced so as to keep the mucous membrane in place when the bladder is

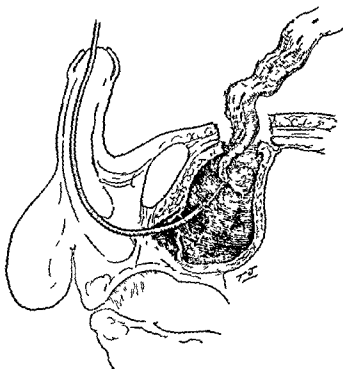


Fig 455—Enucleation of prostate Methods of controlling hemorrhage Packing the cavity with gauze When the catheter is withdrawn from the urethra the gauze is packed snugly against the flaps of mucous membrane (1) by means of the string which has been threaded loosely through the gauze and anchored toward the end of the strip opposite to that which first enters the bladder

distended with gauze (Fig. 456), thus exerting pressure on the edge of the mucosa in the same manner as the bags

There is one other method which I wish to refer to. Kolischer and others have advocated taking large pieces of fat from under the skin of the suprapubic wound and introducing them into the cavity and suturing them in place (Fig. 457) This is done with the object of securing the hemostatic action of the fat Kolischer and others who have used this method are strong advocates of it.

Personally, I have used the bags or packings in preference to the fat. However, it must be admitted that the bags or packings

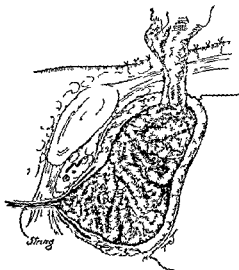


Fig 456—Enucleation of the prostate. Methods of controlling hemorrhage—packing the cavity with gauze. When using gauze for purposes of this kind the bladder is also distended. This is not the case when bags are used. In these cases no drainage-tube is required.

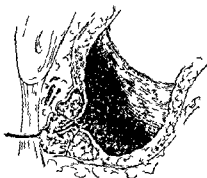


Fig 457—Enucleation of the prostate. Methods of controlling hemorrhage—the transplantation of fat. Fat is sutured in the cavity in contact with the bleeding surfaces in order to obtain the benefit of its hemostatic influence.

must be removed, and at these times secondary hemorrhages may occur, although I have never encountered any. I wish to state

that in the large number of cases in which I have used the packing or bags I have never seen hemorrhage of any alarming extent. It is true that I have had hemorrhages ten to fourteen days after operation in cases where I have not packed or used the bags. When you apply the bags or packings you distend the internal sphincter and prevent it from contracting. This may cause intense pain. This symptom may be of such intensity that morphin frequently will not control it or if it does, unusual amounts are necessary. On the other hand, in some instances there will be no great discomfort. If the bags are used, the degree of distention can be regulated by varying the amount of fluid which they contain and in this manner one may strike a balance where by the pain may be relieved and the pressure still be sufficient to control the hemorrhage. However I have found that if the pains are intense it usually becomes necessary not only to permit the fluid to escape but also to remove the bags, and this is a great disadvantage in comparison with the method of Kolischer. There is no question that where fat is used these symptoms do not occur, nor is it necessary to remove the fat, since it is soon completely absorbed.

If there is no unusual amount of pain the packings or bags are allowed to remain in place forty eight to sixty hours. Often times the pressure is reduced at the end of thirty six hours and the bags withdrawn at the end of forty eight hours. In cases in which hemorrhage occurs regardless of whether packing or bags have been used, I always use horse serum subcutaneously—20 c c at once and repeated in the course of two or three hours if bleeding continues. If the pulse remains small and fast after removal to bed, I give hypodermoclysis of 1 c c of 1:1000 adrenalin solution to 1000 c c of normal salt. This can be repeated at once, and if indication continues, more saline can be given. Coagulose and other preparations have not given as satisfactory results as horse serum.

At the end of thirty six hours if a tube has been introduced, it can be removed when a smaller tube or, still better, a Pezzer catheter may be introduced. In those cases where no packing or bag is introduced I frequently irrigate the bladder with water at

a temperature of 115° to 120° F Retractors can always be introduced in order to observe directly whether or not there is any hemorrhage I always consider it a good point when the blood clots quickly, and in these instances naturally no mechanical methods are necessary to stop hemorrhage A $\frac{1}{2}$ -inch rubber tube with some lateral openings at the lower end is introduced into the bladder. If the bladder contracts snugly around the

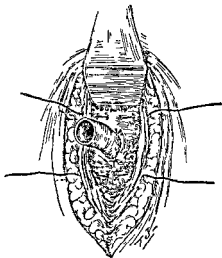


Fig 458—Enucleation of the prostate Closure of the wound and drainage This illustration shows how the bladder is attached to the abdominal wall, and how all dead spaces are obliterated Here the opening in the bladder is closed with sutures above and below the drainage tube With the untied sutures, which are seen passing through bladder wall and fascia, the fascia is brought together and the bladder is securely attached to it Sutures may be used to bring the edges of fascia into apposition if necessary (Compare Fig 459)

tube, no sutures are used I do not suture the tube to the bladder, but I sew the bladder to the abdominal wall above and below the tube. The illustration shows this procedure (Fig. 458). The needle passes through the fascia to one side of the median line, picks up a portion of the bladder, and then passes to the opposite side of the median line and takes up another portion of the bladder, and then out through the fascia I do this above and below. This brings the bladder to the abdominal wall and

ordinarily obliterates any space wherein secretion or urine can collect. One of the points that I wish to bring out is that the bladder should not be unnecessarily loosened from its moorings. The bladder should not be disturbed and separated so that it will be loose in the pelvis, but should remain attached to the surrounding tissues except at the point of incision. If necessary,

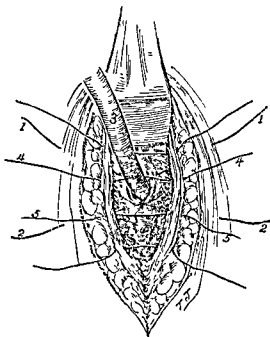


Fig. 459.—Enucleation of the prostate. Closure of wound and drainage. 1-1 and 2-2, Guy rope sutures which are used at the time of the first step. These guy rope sutures can also be used at the time of the second step if the bladder has been unnecessarily loosened during the operation, in order to steady the bladder and also to help obliterate dead spaces. The surface of the bladder should always remain under the musculature and never be drawn upward through the muscle to the fascia. This delays healing and tends to the establishment of obstinate fistulæ. 4-4 and 5-5, Sutures bringing fascia together.

one or two other sutures can be put in above and below the first line of sutures in order to bring the fascia together (Fig. 459). Occasionally it is desirable to place a little gauze drainage above and below the tube. If there are any spaces which have been produced by loosening the bladder, small rubber drains can be introduced and allowed to remain in place for twenty-four hours. The superficial fascia and skin are then brought to-

gether and sutured. The guy ropes should also be tied with pieces of gauze under them.

Postoperative Care—No local attention is given to the bladder for the first three to five days. Then the bladder is irrigated through the suprapubic tube. At the end of five days or less the tube is removed unless a Pezzer catheter has been introduced at the time of operation. However I rarely do this but prefer a fair sized tube at first. A Pezzer catheter is then introduced to allow the wound to get smaller and is removed at the end of ten to fourteen days and the fistula allowed to close. At the end of ten days after the catheter has been removed catheters are introduced into the bladder per urethra and irrigations are made if infection is present. Otherwise the irrigations are not carried out with any regularity. I am in the habit of using weak iodine solution for the ordinary general purpose of keeping the bladder clean. If infection is present I prefer 1:10,000 to 1:5,000 nitrate of silver solution for daily irrigations. Occasionally a permanent catheter is introduced into the bladder per urethra with the idea of preventing the suprapubic drainage so that the patient not being wet continually will be more comfortable. It is not done with the idea that the fistula will close with any greater rapidity.

Naturally here again some of the wounds become infected. If so they are allowed to close by granulation. In such cases it is not uncommon for the fistula to remain open for a considerable period of time. As a rule I do not urge the patients to get up quickly and I practically treat them in exactly the same way as after the first step of the two step operation. If the tube is removed and the Pezzer catheter introduced on the third to the fifth day the patient is allowed to get up in a wheel chair. I have seen no advantage and in fact there are many instances in which it is detrimental for the patients to get out of bed too quickly although it is desirable to have the patients particularly those who are old and decrepit sit up the same day of the operation unless some distinct contraindication is present.

As far as the results are concerned I believe that the mortality is reduced to a minimum by the two step operation and by the

system of preliminary care as outlined; and second, the functional results are most gratifying. In several thousand cases of prostatectomy of all kinds—by the perineal and by the suprapubic route—I have seen less complications following the suprapubic operation and particularly the two-step operation. Furthermore, following this operation, unless a diverticulum is present, the bladder empties itself completely, and in practically all instances the bladder is freed from cystitis unless an infection involving the muscular wall has been present.

CLINIC OF DR. ALBERT J. OCHSNER

AUGUSTANA HOSPITAL

ACTINOMYCOSIS OF THE COLON; ILEOSIGMOID-OSTOMY; TREATMENT OF ACTINOMYCOSIS

Summary A patient presenting a large, tender, nodular intra abdominal mass associated with marked loss of weight, weakness, pain in the abdomen, and the passage of blood, mucus, and pus containing numerous colonies of actinomyces with the stools, technic of ileocolostomy, advantages of end to-side over lateral anastomosis, administration of potassium iodid in cases of actinomycosis, importance of local pathologic defects about the mouth and throat as atria for infection

History.—The patient, a married man of forty-four years, was admitted to the hospital December 15, 1916.

His family history is negative. He had a Neisserian infection twenty-five years ago. He drinks a considerable quantity of beer. He has lost 50 pounds in weight since July 15, 1916.

In July, 1916, while working in a camp, he gradually became weak and had no appetite. The latter part of July he passed a large quantity of bright red blood per rectum, after which he felt much weaker and restless. For the next day or two the stools were black and tarry in appearance. He has passed blood three or four times since then, and the stools usually contain mucus and pus. At first he vomited, even water producing nausea and vomiting. The vomitus never contained blood or coffee-ground material. He belches considerable gas. There is a constant aching pain in the left mid-epigastrium and sometimes he has an aching in the left shoulder and across the lower lumbar region. Occasionally, not every day, but twice yesterday, he has real sharp severe knife-cutting pain, which originates in the upper left abdomen and shoots down into the glans penis. Food does not relieve the pain, but produces a heavy feeling. He

has never been jaundiced. He has some frequency of urination with a scanty amount. Urinates two or three times at night. No blood has been present in the urine. At times he coughs and expectorates some mucus but no blood. He gets weak and has some dyspnea on exertion.

Physical Examination—The patient is a fairly well developed and still moderately obese male, with a fair color and some flushing of the face. His skin is dry. The eyes react to light and accommodation. There is no nystagmus. There is some pyorrhea. The neck, chest, heart and lungs are negative. The liver border is 1 inch below the costal margin and tender. There is moderate tenderness with spasm over the gall bladder area and also moderate tenderness with spasm in the midline midway between the umbilicus and the symphysis. The kidneys are not palpable. An indefinite tumor mass, very tender and painful with adjacent smaller tender nodules, can be felt opposite the umbilicus and to the left side. There is also moderate tenderness down toward the left pubis. Rectal examination shows several large external hemorrhoids present. The prostate is markedly enlarged, especially the left lobe. Proctoscopic examination is negative. There is an induration at the point of crossing of the descending colon and ureter.

Comments and Operation—DR. OCHSNER (December 18 1916) In this patient we have a tumor beginning on the proximal side of the splenic flexure of the colon and extending well beyond the splenic flexure causing quite a marked obstruction. It has the feeling of an inflammatory growth. The mesenteric lymph nodes are greatly enlarged, the largest one being 3 cm. long and 1 cm. thick. The mesenteric lymph nodes not only of the transverse mesocolon but also of the jejunum and upper portion of the ileum are involved. Consequently it is not possible to remove this growth safely. Moreover it is not necessary that the growth be removed surgically. In the first place this growth has all the characteristics of an inflammatory granuloma and second we have repeatedly demonstrated colonies of ray fungi—actinomyces—in the pus which this man passes per rectum. We therefore make the diagnosis of actinomycosis of the bowel with

obstruction This growth being of inflammatory origin—due to actinomycosis—it is likely that the obstruction which it produces will later subside under the influence of the treatment which I shall describe later, the object of our present operation being to relieve the obstruction which is endangering the patient's life.

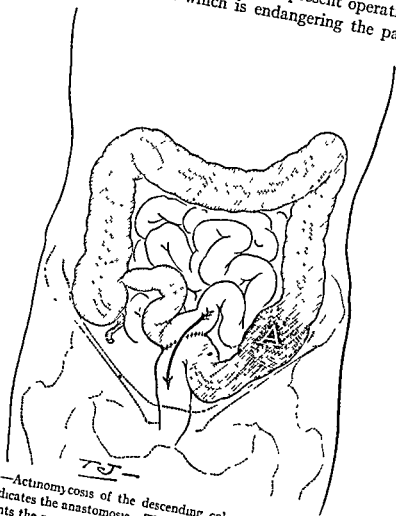


Fig 460—Actinomycosis of the descending colon A marks site of lesion. The arrow indicates the anastomosis The shaded area of the terminal ileum and colon represents the portion of bowel short-circuited by ileosigmoidostomy

Consequently, we will make a side-to-side anastomosis between the ileum and the sigmoid, taking a portion of the ileum 20 cm. away from the ileocecal valve and attaching it to the sigmoid flexure just above the beginning of the rectum (Fig 460). We make our anastomosis $7\frac{1}{2}$ cm long, so that there cannot possibly be any obstruction later.

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and to implant the proximal end into the side of the sigmoid, since it has been pointed out by Percy, Lane, and others that a lateral anastomosis is not so satisfactory. A lateral anastomosis may permit some of the fecal material to pass on into the cecum instead of short circuiting, and the opening may fail to functionate at all. Again, if we close the ends of the severed ileum and make a side to side anastomosis between the sigmoid at the upper end of the rectum and the proximal segment of the ileum, the closed end of the ileum may form a pouch in which feces may accumulate and harden, thus giving rise to more discomfort, to acute inflammation or even to perforation. By making an end to side anastomosis, implanting the end of the ileum into the side of the sigmoid or upper end of the rectum, all this trouble can be avoided.

There is a certain amount of danger from the backing up of the feces in the proximal end of the sigmoid. This can be avoided by passing the distal end of the ileum through a buttonhole opposite McBurney's point, through which the colon can be irrigated. In this case the obstruction at the splenic flexure of the colon would make this step impossible, and the question arises whether it would be wiser to cut off the ileum and pass it through the abdominal wall for the purpose of irrigating the ascending and transverse colon or whether the plan we have followed is better. The plan we have followed has the advantage of being a little more simple, and in case the growth proves to be due to actinomycosis, as we have assumed, upon its disappearance it will be possible to re-establish the normal intestinal route very easily. On the other hand, if this anastomosis should not functionate satisfactorily, it will always be an easy matter to cut off the ileum above the anastomosis, attach the proximal end to the colon, and pass the distal end through the abdominal wall. That can be done at any time.

Now I am fastening the sigmoid and the ileum to the pelvic peritoneum just above the point of anastomosis in order to make it impossible for any portion of the small intestine to slip through the mesentery and become strangulated. It does not seem that the immobilization caused by this step can cause any great amount of

trouble and the security that it gives the patient against strangulation seems to be well worth while. Now we will bring down the omentum and close the abdominal wall. The patient will be given intensive x ray treatments because this treatment can be expected to improve the condition in case the tumor is malignant and to aid very materially in the cure of the patient if the tumor is due to actinomycosis.

We have found in the case of actinomycosis or blastomycosis that the following treatment is indicated. We give these patients 90 grains of potassium iodid in $\frac{1}{2}$ pint of milk at 6 o'clock in the morning at 2 o'clock in the afternoon and 10 o'clock at night that is three doses eight hours apart usually giving 90 grains and never less than 60 under any condition because we have found that less than 60 grains seems to have no effect. We continue this dosage for four days. Then we stop for a week and then repeat for four days. This we continue for three or four periods depending upon the location of the trouble. If there is an accumulation of pus as in pyemia for instance where it is impossible for the potassium iodid to reach the infected tissue we evacuate the pus if we can. If we cannot we continue the treatment for three or four periods once a month until all the pus has been absorbed because otherwise some of the infecting organism may remain at a point where they cannot be reached by the potassium iodid in the circulation and if the treatment is discontinued before all the organisms are killed they will re-infect the tissues and the trouble will begin all over again.

A week ago today we operated upon a veterinary surgeon who has a large practice in Wisconsin and we discussed this question with him. He told us that he has been very successful in treating actinomycosis in cattle by the following method. 120 grains of potassium iodid are given in an abundance of water morning and evening. This dose is repeated daily until the animal by the looks of its eyes and discharge from its nose shows that it is full of iodine. Then it is stopped for a week to be repeated the following week. This is done for several weeks and the result is a complete cure.

I remember forty years ago when there was an old farmer up

in Wisconsin who used to cure lumpy jaw For many miles around his farm he got the name of being able to cure lumpy jaw He used the following plan He placed the animal in a box stall in which was a pail of water containing 2 ounces of the iodid of potash and allowed the animal nothing else to drink until the water was all gone Then it was given another pail of water He would repeat this dose at weekly intervals for a period of several weeks and regularly cured those cases of lumpy jaw Taking what our veterinarian told me yesterday with what the old veterinarian did forty years ago, it seems that the old veterinarian iodized the patient with the first dose This veterinarian today gives the cattle probably the same amount in doses of 2 drams, but I was surprised to find that he was successful with 2 drams, since it is not much more than we give a man However, it is quite possible that the quantity passing through the circulation will do the work He also gives it for several days to a week We give it for four days The important point is that you must not give it continuously We had one case in which we gave it right along for six weeks and then stopped but in two or three weeks the disease started up again In other words certain of the organisms, possibly the spores, although opinion is divided as to whether actinomyces produce spores or not are left dormant by the presence of the iodin As long as the iodin is there, the spores cannot develop We have had some very striking examples to illustrate this point

One patient came in with actinomycosis of the lower jaw, which had gone into the neck and down into the larynx We treated him with potassium iodid and in six weeks he was apparently well A year later he came in with edema of the glottis He had been well during the meantime We thought we had to deal with a case of actinomycosis of the larynx He was nearly dead when he came in, and had traveled a distance of five hundred miles after he started to choke We gave him this remedy again and did various things to enable him to breathe for a few days until the remedy had its effect, and he again recovered Then we gave him the remedy once a month for six months It is ten or twelve years now and he has been perfectly well ever since

We had another case, an equally interesting one, in which there was actinomycosis of the colon and liver, with an associated empyema. We treated him in the same way and he got apparently well. After he was apparently well we lost sight of him. He went to another physician who treated him until he died. At the autopsy there was found a healed scar in the colon and in the liver, and an abscess in the chest from which his final actinomycosis had developed. Now, if we had known of the abscess we would have given him this treatment once a month for five or six years, always in time to kill off the mature or active organisms that had developed from the spores or latent actinomyces contained in this abscess, if we had been unable to cure the abscess which we had overlooked by surgical means. If we had been successful in the surgical treatment of this abscess we would have given the patient potassium iodid and he would undoubtedly have gotten well.

One thing which our veterinary friend told us was that when ever there is a hoof nail or a rough tooth or any point that may become infected or cause a wound it must be removed, because it may furnish a nidus through which re-infection may occur. If there are pieces of dead bone in the jaw in these cases he takes them out.

For many years we have been in the habit of removing infected teeth, tonsils and all other easily accessible sources of infection in cases of actinomycosis because of the well known fact that actinomycosis is fundamentally a local disease, spreading through the tissues by direct extension and originating as a rule in tissues which are already diseased such as carious teeth, or, in intestinal and abdominal actinomycosis, where there is marked stagnation of the fecal current such as is frequently the case in the large intestine. Actinomyces growing in the cavity of a carious tooth may supply a constant stream of fungus colonies which, swallowed with the food and secretions of the mouth, may search out a point of lowered resistance in the intestine—possibly the lodging place of a fecolith in one of the haustra—and produce the very serious picture of abdominal actinomycosis such as you see today.

There is one other point I might mention: You remember the extensive lymphatic involvement which this case presented. In all probability that represented the effects of secondary infection, since the actinomyces notoriously avoid lymphatics and but rarely travel by the blood-stream. Hence we find, as I have already indicated, the infection almost universally spreads by direct extension, by continuity, and contiguity of tissues. Distant metastases are not likely to occur, so that generalized actinomycosis, unlike generalized blastomycosis or tuberculosis, is a very rare disease. We also find that abdominal actinomycosis is frequently secondary to oral actinomycosis; that laryngeal actinomycosis and actinomycosis of the neck are likewise frequently secondary to oral actinomycosis, and that pulmonary actinomycosis may be secondary to oral actinomycosis or to abdominal actinomycosis by extension through the diaphragm.

NOTE.—The patient was given treatment as outlined above, beginning the day after the operation. Two days later the tumor was less adherent to the abdominal wall, much less tender, and it was markedly smaller. When he left the hospital on the twentieth day the tumor was about half as large as at the time of admission and his general condition was greatly improved.



CARCINOMA OF THE RECTUM—EXCISION—TRANSPLANTATION OF SIGMOID INTO PERINEUM—TECHNIC OF OPERATION

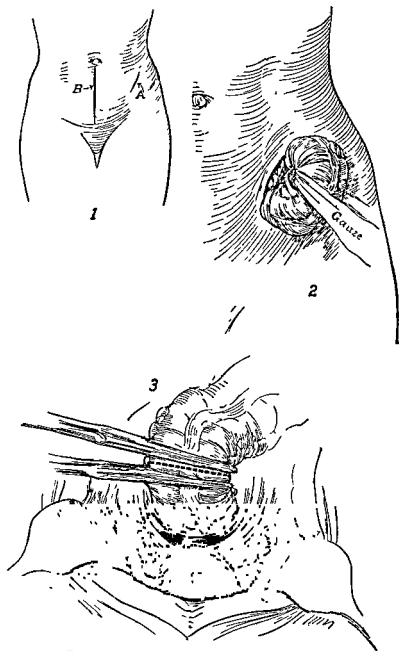
Summary Passage of blood and mucus per rectum with some associated tenesmus for six weeks the only symptoms of a large carcinoma of the rectum removal of tumor by the combined abdominal perineal route inguinal colostomy without opening bowel as a precautionary measure the perineal anus patient should be made to lie on one side or the other for the first few days after operation

History—The patient, a married woman of fifty three years, was admitted to the hospital September 16, 1916, because of a carcinoma of the rectum

Her mother died at the age of fifty of brain tumor One uncle died of tuberculosis There is no history of carcinoma in the family The patient had spinal meningitis at the age of twelve, following which she was deaf for one year Her thyroid gland was removed in February 1915 She had the menopause at the age of forty five She has been married thirty one years and has had nine children, five of whom are living Her habits are good Before the goiter operation she had diarrhea and incontinence of feces She has no trouble with urination

Present Complaint—Six weeks ago she began to notice a small amount of blood at times in the stool She had no pain Two or three weeks later she noticed blood and mucus and some tenesmus These symptoms have grown worse Last Monday she went to a hospital where she remained for three days While there she took salts and oil on several days in succession with little result She has no pain and has lost no weight that she knows of

Physical Examination—The patient is a well-developed and well nourished adult with a clear skin The throat is negative The upper teeth are missing There is a collar incision over the anterior and lower part of the neck which is well healed Heart, lungs and breasts are negative The abdomen is very flaccid, rounded, striated, and slightly pigmented There is no tender



Tom Jones—

Fig. 461.

ness The uterus is small and retroverted and the cervix is lacerated bilaterally Slight cystocele and rectocele are present Examination by the rectum shows that, beginning at a point 4 cm from the internal sphincter is a ring like, moderately hard, easily movable cauliflower mass encircling the lumen of the rectum The lumen admits the tip of one finger No glands are palpable

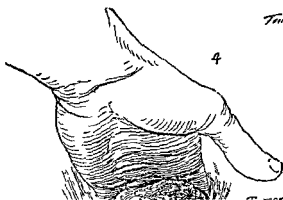
Comments —DR. OCHSNER (September 18, 1916) This patient has a carcinoma of the rectum The carcinoma is located so high that it is not possible to remove it from below with any degree of satisfaction I have, consequently, made a median abdominal incision (Fig 461, 1) Upon examining the liver I find that it contains no secondary growths Examining the colon I find a very long sigmoid flexure This is very favorable for our purposes, as it will enable us to make the excision and bring the colon down to the perineum without tension and without endangering its blood supply I am trying to locate a point at which it will be possible for me to do a colostomy without interfering with this long sigmoid flexure I wish to do a preliminary colostomy in order to protect the portion of bowel which is to be brought down into the perineum from the accumulation and passage of irritating gas and fecal masses until healing is complete

Here I find a piece of the colon at the junction of the descending colon and sigmoid which I can pass through the opening I have made in the left inguinal region I make this opening by cutting the skin and superficial fascia and then splitting the aponeurosis of the external oblique muscle in the direction of its fibers from without downward and inward In this patient the internal oblique muscle is exceptionally weak so that there are just a very few fibers present, but here again I split in the direction of the fibers in order not to cut any of the muscle I then bring up the lower end of the descending colon, pass it through

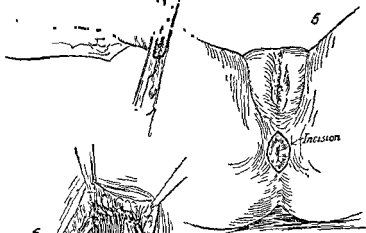
Fig 461 —Operation for excision of the rectum for carcinoma 1 A Colostomy incision B median abdominal incision 2 A loop of the descending colon has been brought out through the colostomy opening and is kept there by a strip of gauze which passes through the mesenteric attachment 3 The rectum has been grasped by two heavy clamps and is about to be severed between the clamps along the dotted line

Two Tones—

4



5



6

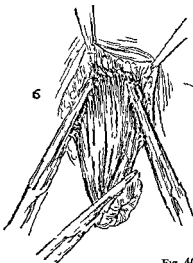


Fig 462

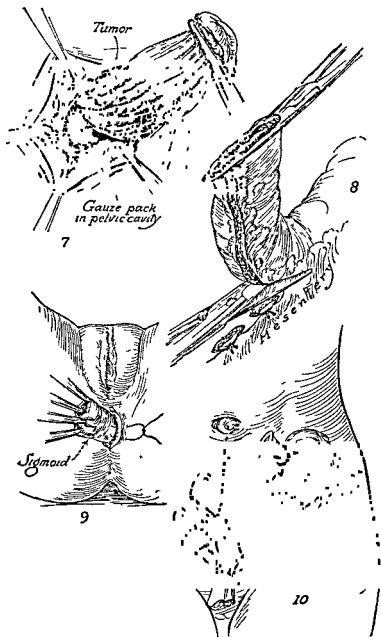
the wound, and secure it temporarily by means of a strip of gauze with which I encircle the bowel, perforating the mesocolon at its junction with the intestine (Fig 461, 2)

We bank away all the intestine by means of gauze pads. This leaves exposed only the pelvic structures, so that every step of the operation will be in plain view. Now I locate the tumor which is in the lower rectum. I find that there is no involvement of the intestine above the brim of the pelvis. I place a suture temporarily in the fundus of the uterus in order to retract it so as to leave the entire field exposed. Now I grasp the colon 5 cm. above the uppermost portion of the growth between heavy clamps and sever the intestine at this point (Fig 461, 3)

Now we are unfolding the lower segment step by step, severing the peritoneum and removing all the pelvic fat as we go along (Fig 462, 4). In our progress I find that everything is loose and there are no adhesions which means that probably this entire tumor is located within the rectum. There is absolutely no need in hurrying because a few minutes of time is not of the slightest importance here. You see how well these tissues can be retracted by means of the long retractors so that everything is in perfect view. Now we have this lower segment loosened throughout its entire length and are prepared to turn our attention to the rectum. You can easily see that one of the most important parts of the whole procedure is in the hands of an assistant who is holding the upper segment of bowel. Our success depends on his care in handling that proposition. We have taken every precaution to get the bowel empty, starting three days ago, and still it is not quite clean, and if our assistant allows that segment to slip this patient's life will probably be terminated by a general peritonitis.

We shall now place the patient in the lithotomy position in order to work on the perineum. With the patient in the lithotomy position I place my incision around the anus (Fig 462, 5)

Fig 462—4 Rectum together with the tumor and the perirectal fat and lymphatics, freed by blunt dissection. 5 Perineal incision. 6 Dissection of lower rectum from perineal tissues. A forceps closes the lumen of the anus. The levator ani muscle is shown at each side in the bite of the forceps.



Tom Jones

Fig 463

and dissect back the lower end of the rectum. Now I apply a pair of forceps to the levator ani muscle on each side (Fig. 462, 6), sever it, and grasp all the bleeding points with artery forceps. The rectovaginal septum in this case is exceptionally thin, so that I have to use the very greatest care to avoid cutting the vagina. The total loss of blood amounts to nothing because we grasp every vessel before we cut it. I have entered the peritoneal cavity posteriorly and I am dissecting with my finger all the tissues, so that with the rectum I will remove every bit of the pelvic fat, but so far I have not encountered the least particle of tissue outside of the rectum that feels suspicious of tumor growth. In order to obtain space I pack the entire pelvis with gauze (Fig. 463, 7) and ligate all the vessels controlled by forceps, so as to have an entirely free field. In addition, we thus clinch our control of hemorrhage by ligation of all the larger vessels, while the pressure of the gauze which we have packed into the pelvis overcomes any oozing from capillaries or small veins. There are two very important factors in this operation that must never be lost sight of which are technical in character, namely, the elements of unnecessary traumatism and loss of blood. It is a relatively easy matter to avoid both of these if one's attention is constantly given to them.

Now I remove the pads that I have applied and find everything dry. I have succeeded in loosening this entire mass and I now remove it in one piece. We must next turn our attention to the reconstruction of the rectum. This we will endeavor to do by implanting the end of the sigmoid in the perineal wound. You see I have the end of the sigmoid flexure at my command. By cutting the mesosigmoid for a short distance (Fig 463, 8) with

Fig 463 —7. The entire rectum dissected free just before removal through the perineal incision. The gauze pack used to control hemorrhage from raw surfaces is visible in the depths of the wound. 8 Sigmoid being loosened from its attachment in order to lengthen the free segment. 9 Sigmoid projecting through the perineal wound and the first silk suture applied. The cigarette drains are not shown. 10 The abdominal wound closed with drainage from pelvis. The two forceps have been applied to bleeding vessels along sacrum and are to be removed in thirty-six hours. A glass tube has been used to replace the piece of gauze supporting loop of descending colon in the colostomy opening.

due regard for the blood supply of the adjacent segment of bowel, we are able to mobilize the sigmoid sufficiently to allow me to bring the cut end through the perineal opening. I place a cigarette drain on each side of the pelvis and then pass forceps up from the lower wound and bring the sigmoid down, suturing the stump exactly in the middle of the perineum (Fig 463, 9). We had a visit from Professor Grasse, of Halle, some years ago while we were doing an operation of this type. Before that we had always fastened the lower stump to the posterior end of the perineal wound, believing we would get better control of the bowels in that way, but on his suggestion we changed to this plan we are using today, and have found it much more satisfactory. We place a few silk sutures in the sigmoid so as to take tension off this lower segment, although we have loosened it sufficiently to prevent any tension to speak of, and then suture the end of the sigmoid so that it projects about 2 cm beyond the level of the skin.

The one precaution which we should take after this operation, and I think it is very important, is to prevent these patients from lying on their backs because that is likely to cause an accumulation of fluid in the pelvis. We elevate the head of the bed so that all the drainage will be downward and we have the patient lie on one side or the other all the time. The last step of the operation is the substitution of a glass tube for the gauze with which we anchored the colon in our colostomy incision (Fig 463, 10). The colostomy will be opened in forty eight hours if necessary and will protect the operative field from contamination until healing is complete.

CLINIC OF DR. CARL B. DAVIS

PRESBYTERIAN HOSPITAL

CANCER OF THE RECTUM

Summary. Indications governing the choice of operation in the surgical treatment of cancer of the rectum and suggestions as to the technic involved, the Ball operation, dangers of end-to-end anastomosis, necessity of opening abdomen in order to determine operability, contraindications for operation, the combined operation and the abdominal anus, diagnosis easy if patients are examined—frequent confusion with simple hemorrhoids

FOR a malignant growth at any given place in the rectal canal the operative treatment is not constant. The indications vary with the extent of the tumor, what neighboring or distant structures are involved, and with the age, sex, and condition of the patient.

Malignant disease of the anal canal is best treated by total extirpation of the anus, sphincters, and inguinal lymph-glands, and terminating the gut with a sacral or abdominal anus. If the disease is limited to the anal epithelium it is not necessary to remove the ampulla or glands behind the ampulla, as the lymphatic drainage of the anal canal is downward, across the perineum, and into the inguinal lymph-glands.

Carcinoma of the ampulla when present as a small adenomatous mass early in its development is sometimes treated by the cautery. Ball has devised a method to save the nerve-supply to the anal muscle intact where the lower portion of the ampulla is resected and the gut brought down through the sphincters in an effort to preserve function. Through incisions in the perineum and in the rectococcygeal space a ligature is carried around the bowel above the level of the anal canal (Fig 464). This ligature is used to hold the fecal contents in place when the bowel is cut

off The sphincters are incised anteriorly and posteriorly and the anal segments with their nerve supply intact turned aside (Fig 465) The ampulla is resected, pulled down, and attached to the anal sphincters, which are united at the anterior and

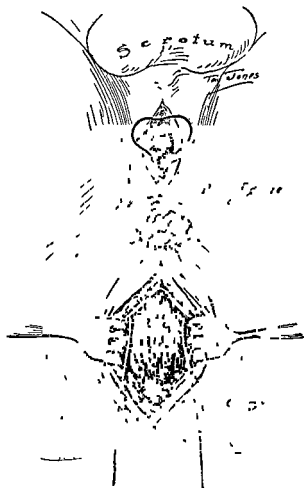


Fig 464 —Technic of Ball for resection of the lower ampulla.

posterior planes of section The anal epithelium is removed to permit of adhesion between the rectal wall and the sphincters (Fig 466)

Carcinoma low in the ampulla, where at all extensive, is best

treated by total extirpation of the entire ampulla with its blood-vessels and lymphatics. The termination of the procedure is a matter of debate at present. In some instances it has been possible to bring the gut down from the pelvis and draw it through the sphincters and preserve anal function. Where this



Fig. 465.—Technic of Ball. Sphincters incised anteriorly, posteriorly, and severed from the ampulla of the rectum.

method is employed the operator is prone to leave too much gut or too much of the lymphatic system, either of which may contain malignant disease. A more thorough procedure is to terminate the bowel as a sacral or abdominal anus. Where the growth is at the upper limits of the rectum just at the pouch of Douglas,

it is possible to mobilize the rectum in its upper limits through an abdominal incision and to resect the gut below the level of the growth, and then to do a complete extirpation of glands, fat, and gut well above the level of the growth. Where this is done it is safer to leave the superior hemorrhoidal artery, as sloughing

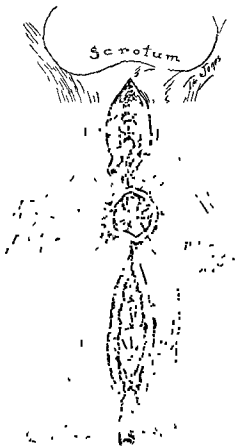


Fig 466—Technic of Ball. The gut pulled down. Sphincters repaired anteriorly and posteriorly.

will occur in some cases where this source of blood-supply is cut off. The distal end of the gut is turned in and the remaining rectum left as a blind pouch. Complete removal of the gut and glands below the level of the tumor is not necessary, as the lymphatic drainage of the rectum is upward toward the aortic glands.

The junction of the anal canal of flat epithelial cells and the cylindric cell layer of the ampulla is a sort of lymphatic watershed, with the lymphatic flow of the anus passing downward toward the inguinal glands, and the lymphatic drainage of the cylindric cells of the ampulla passing upward toward the aortic glands (Fig 467) This is due, of course, to the fact that the



Fig 467 —Directions of lymphatic drainage in the ampulla and in the anal canal

two structures originate from different embryologic sources. The anal plate, or proctodeum, comes from an infolding of the ectoderm. Hence the drainage is the same as that of the skin of the anal region. The ampulla of the rectum is the lowermost portion of the hind gut which gives rise to the lower intestinal tract. By leaving this blind pouch the patient is spared the

small gut and glands in the mesentery would be necessary. This should be attempted only when the patient has an unusual vitality.

Operability is a factor which varies with the judgment of the individual surgeon. If the operator is inclined to do the greater number of his cases by some form of Kraske or poste

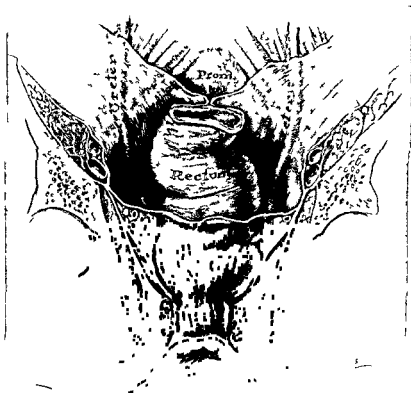


Fig. 469 —Relation of the ureters and rectum

rior route he will find a much smaller number of cases adapted for operation than he who uses the combined abdominal perineal route. Again with increasing experience, the range of operability increases. This is well shown in the work of the Rochester Clinic. In the first 619 cases they had an operability of 53 per cent. In the last 277 cases they found 72 per cent were operable.

Operative mortality has been an extremely variable factor. Cases not operable by the Kraske route have been attempted by the combined route, and when lost the more complete procedure has been given a bad reputation undeservedly. Again, with any given procedure the operator is inclined to extend his limits with an increasing experience. With a more aggressive treatment we are bound to increase the mortality, but, as Mayo has pointed out, we are constantly saving more patients out of a given number.

The ultimate mortality is a most valuable indicator. While the immediate mortality has been lower following the Kraske operation, the final condition of the patient shows a recurrence in a far larger number when operated by the Kraske when compared with the combined operation. Hartman of Paris in a compilation of cases from the French, British, German and American literature, finds a mortality of 37 per cent for the combined cases and a mortality of 15 per cent for the posterior operation. The recurrences in the combined route were 18 per cent, while the recurrences in the posterior operation were 68 per cent. Thus 37 per cent mortality plus 18 per cent recurrence gives 55 per cent dying from cancer when treated by the combined technic against 15 per cent immediate mortality plus 68 per cent recurrence or 83 per cent dying from cancer when operated by a posterior operation.

Function following operation is an important element to the patient. Preservation of sphincter control is ideal but can be obtained only in low lying cases or rectosigmoidal cases as a rule. When the decision is left to the patient there is usually a demand that if a normal anus is impossible then a termination of the bowel be obtained as near the normal site as possible. The suggestion of an abdominal anus is repugnant not only to the patient but to many medical men as well. This decision should not be left entirely to the impression of the patient. A properly constructed abdominal anus is not to be compared with the colostomy obtained by pulling the sigmoid loop through the flank and later incising the gut. The advantages of the abdominal anus are that it is capable of greater control. It is cleaner and it is more easily

cared for by the patient. The patient can determine the condition of affairs by sight rather than by touch. A good abdominal anus is obtained by bringing up the end of the resected sigmoid out of the pelvis, carrying it through the peritoneum and muscles, and then upward again beneath the skin for a distance of 2 inches,

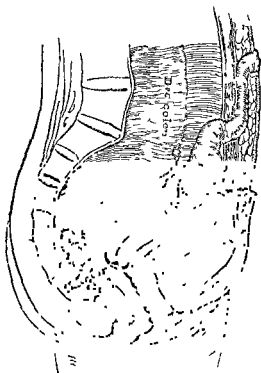


Fig 470—Diagrammatic representation of the construction of an abdominal anus. This represents the work done, as a rule, in the first stage. The lower portion of the rectum and the tumor mass is removed at a second stage by an extra peritoneal operation through a sacral incision.

as shown in Fig 470. In this procedure the dependent loop formed in the sigmoid acts as a reservoir and there is no frequent loss of stools. With a flushing each twenty-four hours there is perfect control in many cases. Again, the bowel lying beneath the skin is readily compressed by external pressure, thus controlling the escape of gas. With this type of anus there is no need

of the cumbersome foul-smelling rubber bags to catch escaping feces. A metal cup fitted with a pneumatic ring and supported on a belt makes a light simple apparatus that is inexpensive and is readily cleansed. The pneumatic ring pressing on the gut as it

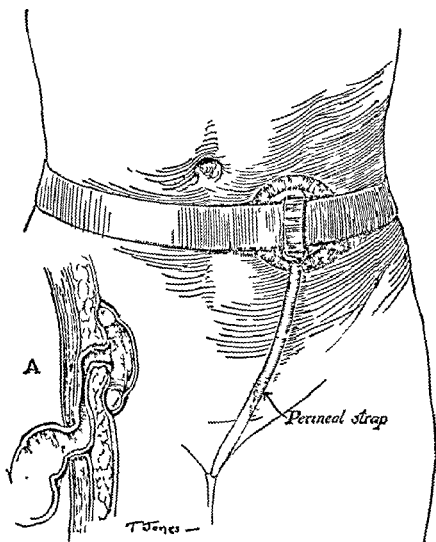


Fig 471 —A simple and efficient colostomy cup

extends beneath the skin is of value in controlling the escape of gas and the occasional fecal mass (Fig 471)

Diagnosis is not difficult if the patients are examined. In many cases the physician has been satisfied by a visual verification of hemorrhoids after the patient has reported for blood in

the stools. Hemorrhoids are a secondary development found in numerous cases of malignant disease of the rectum. A proctoscopic or even a digital examination in most cases will establish the diagnosis with ease. A section removed for microscopic examination will settle the diagnosis. There is no other condition of the rectum which gives the same sensation to the examining finger as that given by the usual ulcer in the growth surrounded by the indurated edges. No case of blood in the stools should be operated for hemorrhoids until the physician has satisfied himself that cancer is not present.

About one third of all the cases of rectal cancer operated in the Presbyterian Hospital of Chicago during the last ten years have had an operation for hemorrhoids within a few months previous to their entrance with malignant disease finally demonstrated.

CLINIC OF DR. ARTHUR DEAN BEVAN

PRESBYTERIAN HOSPITAL

CARCINOMA OF RECTUM—TREATMENT BY LOCAL EXCISION

Summary · Detailed technic of local removal, types of cases suitable for this procedure, after treatment—healing by granulation, results preferable to those following radical removal with inguinal or sacral anus.

THIS patient is a comparatively young man, being but thirty-seven years of age. He has a small localized carcinoma in the rectum covering an area about 1 or $1\frac{1}{4}$ inches in diameter, and situated 3 inches above the sphincter on the anterior surface of the rectum. Most of our patients with carcinoma of the rectum are well over forty years of age as a rule. This man has been complaining of some discharge of mucus and blood, and the lesion was discovered by the physician whom he consulted with these symptoms. He was then referred to my service.

I want to take this opportunity of going over pretty fully the operation which we are employing for cases of this kind, and which has given such very excellent results in selected cases as compared with any other method which we have employed.

Now that the patient is etherized I shall have him brought in. You see that I have placed him face downward on the table, which is broken in the middle, so as to raise the pelvis well above the head and lower extremities. I now make an incision about 5 or 6 inches in length from the lower end of the sacrum down to the anus (Fig. 472). I divide the skin and superficial fascia and expose the coccyx above, separate it from its ligamentous attachments and find the line of articulation between the coccyx and the sacrum, and cut this through with a pair of bone-cutting forceps (Fig. 473). Removal of the coccyx in these cases gives one

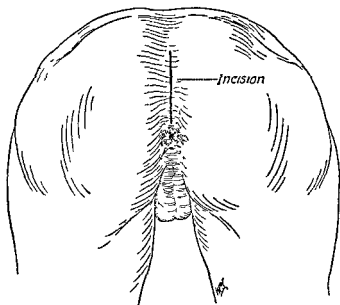


Fig 472 —Incision extending from last sacral vertebra to anus

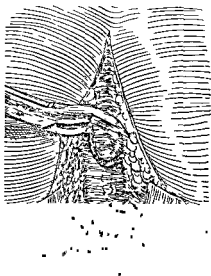


Fig 473 —Removal of coccyx

a much freer field for operation, and as it does no permanent harm, I have selected it as routine in these operations. Beginning now at the anus and putting short artery clamps on the entire thickness of the sphincter and rectum, the posterior surface of the rectum is split open for a distance of 3 or 4 inches or more, in this case about 4 inches (Fig. 474). As we divide the rectum posteriorly the carcinoma is very completely and fully brought into view (Fig. 475). The posterior incision which we have



Fig. 474.—Line of incision in posterior wall of rectum—clamps in place to control hemorrhage.

made has enabled me to examine the tissues between the rectum and the sacrum, and I find no evidence whatever of glandular enlargements. I regard this case, therefore, as one particularly suited for the operation which we have chosen.

With a Paquelin cautery I cut out the carcinomatous lesion, going well beyond the margin of the growth and dividing all the layers of the rectum, exposing the areolar tissue between the rectum, membranous urethra, and prostate (Fig. 476). With

medium-sized catgut and a non-cutting curved needle I sew together the raw surfaces of the wound left by the cautery excision. This is done largely for the purpose of controlling any possible hemorrhage, as well as to approximate, in a general way, the structures at this point (Fig 477). Beginning now at the upper end of the incision in the rectum I close this completely with sutures and another layer of black linen, with the knots tied inside the caliber of the bowel, and over this a line of sutures of



Fig 475 —Exposure of carcinoma on anterior wall of rectum completed.

catgut (Fig 478). The incision in the rectum is completely closed. A piece of iodoform gauze is packed into the rectum and over the area from which the carcinoma has been removed and brought out through the sphincter. Another small gauze drain is put in at the upper angle of the wound and the external incision is closed with silkworm gut and with black linen (Fig 479).

I have operated, by this method, on quite a number of cases during the last five or six years, and I believe it is a method that



Fig. 476.—Excision of carcinoma with cautery.

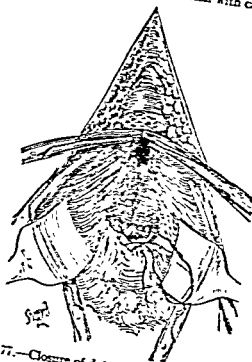


Fig. 477.—Closure of defect after removal of tumor.

should be adopted in beginning small carcinomas of the rectum without any radical involvement. We have employed it in cases where it has been necessary to remove at least one-half of the caliber of the gut. In these cases we have packed the big raw surface from which the carcinoma was removed with iodoform gauze and allowed it to heal by granulation, keeping open a good-sized caliber, and have attained surprisingly good control in patients where at least one-half of the caliber of the sphincter

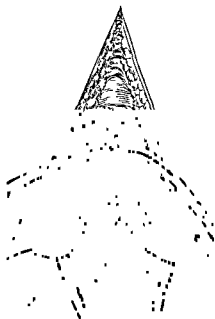


Fig 478—Closure of incision in posterior wall of rectum. Knots tied on mucous membrane side of bowel.

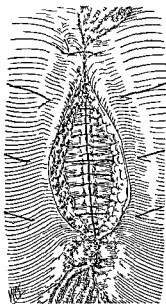


Fig 479—Superficial approximation by deep tension sutures. Note gauze drains.

has been removed. Personally, if I had such a condition as the patient upon whom we have just operated, I should like to have this thorough local operation done rather than to have the entire rectum removed, and have either a sacral or an inguinal anus. In this operation we apply practically the same principles of surgery that we apply in doing an operation for the removal of an epithelioma of the lower lip. The prognosis, of course, is not nearly as good as in cancer of the lip. At the same time we have

a number of cases alive and well two, three, and four years after these cautery operations in the lower bowel

The second case I want to show you is a man upon whom I did a somewhat similar operation two weeks ago. He is a man of about seventy five. I found that in this case I had to remove at least one half of the sphincter and fully one half of the rectum for a distance of about 3 inches from the sphincter. This exposed widely the membranous urethra, prostate, and seminal vesicles. It was impossible to close this area with sutures, so I stitched in a large rubber tube about $1\frac{1}{2}$ inches in diameter and packed the uncovered surfaces of the membranous urethra, prostate, and seminal vesicles with iodoform gauze and left this very large area to granulate.

The patient has made a surprisingly good recovery in spite of his age and the lowered condition of his general health, the result of the carcinoma which had given him great distress for several months. I do not hope to attain anything like complete continence in this case but I think, on the whole, the man will be made much more comfortable at much less risk by this operation than by any other means we could have employed in his case.

X-RAY BURN OF ANAL REGION

Summary Patient suffering intolerable pain from a burn following x ray treatments for pruritus ani treatment by excision of burned area and simple closure of mucous membrane and skin preliminary colostomy and extensive plastic operation unnecessary

THE next patient upon whom I shall operate this morning is one with a very lamentable and unusual picture. The patient was troubled for a long time with a distressing pruritus ani and at the advice of a very good medical man he was sent to some x ray experts and the area around the anus subjected to x ray exposures for some time. Unfortunately, he was either unusually susceptible to the action of the x ray or else it was used stronger than was intended and as a result the skin around the anus was very badly burned for an area of 6 or 7 inches in length and $2\frac{1}{2}$ inches in width. The condition has been most distressing. I do not know that I have ever seen an individual who has had more suffering than this particular patient. Every movement of the body is painful. Having a bowel movement as excruciatingly painful it is necessary for him to take $\frac{1}{2}$ grain of morphin to control the pain before he can have an evacuation of the bowel.

He has consulted a great many medical men both in this country and abroad. The opinion has been given him frequently that a plastic operation is necessary, and that this however, should be preceded by a colostomy in order to place the parts at rest during the repair of the plastic. He was sent to me by Dr. Oliver Ormsby, who has had an unusually wide experience in employing the x-ray for therapeutic purposes and has seen and treated a large number of x-ray burns. He has also treated a good many of these cases of pruritus ani.

After examining the patient the problem seemed to me after all a rather simple one as I analyzed the facts. I could not see the necessity for swinging over any flaps nor any reason for one moment of doing a preliminary colostomy. I have had a large experience with just such cases, as I have shown you this morning,

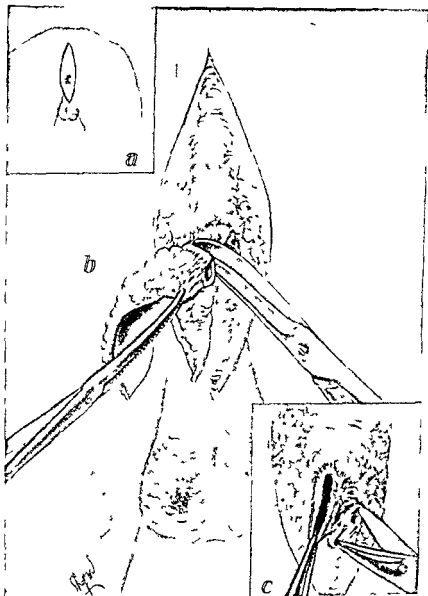


Fig 480—x Ray burn of anal region a, b, c, Steps in the excision of the burned area

of carcinoma about the anus where repair by granulation tissue has been so surprisingly good, even though it occurred in an infected field, and I determined to do the perfectly simple operation

this morning I shall dissect out widely the area burned by the x ray, free the mucous membrane of the rectum very much as we do in a Whitehead operation, and bring the lines of the skin incision together with suture, stitching the mucous membrane of the rectum to the skin so as to make a complete closure of the raw area.

Under anesthesia, and with the patient in the same position as the previous cases operated on (lying on the face with the buttocks well elevated), I free the damaged skin through this large longitudinal incision (Fig 480, a). The mucous membrane of the rectum is now dissected up for a distance of $\frac{1}{2}$ to $\frac{3}{4}$ inch and then the entire flap of damaged skin is removed (Fig 480, b). This leaves the uninjured mucous membrane projecting about $\frac{1}{2}$ inch beyond the sphincter (Fig 480, c). The line of incision is now closed without difficulty by tension sutures of silkworm gut and the mucous membrane is sewed with a large number of fine black silk stitches to the skin (Fig 481).

Postscript—The result of the operation is most satisfactory. I have had quite a large experience in dissecting out x ray burns. The pain from an x ray burn is very often excruciating, and as a rule, it disappears completely after removal of the injured tissue. I have had experience also in dissecting out x ray burns from the breast in patients who were taking morphin to relieve the constant pain and found that immediately after the operation the pain entirely disappeared and the desire for morphin in spite of the fact that large amounts had been used for a good many months disappeared almost entirely with it. In this anal x ray burn we had very much the same experience. The old pain from the x ray burn disappeared at once. The nervousness and desire for a moderate amount of morphin persisted for ten days or two weeks. Three fourths of the wound healed by primary intention. A small part about $1\frac{1}{2}$ inches in length posterior to the anus, kept open, but healed within fifteen or twenty days completely.

I have had no more satisfactory result in surgery than the one we have obtained in this case. By a very simple operation the patient was permanently relieved from a most distressing condition. Since that time I have seen one other case very similar to this one, although not as distressing because the burn was not

nearly as extensive nor as deep in degree. In this second case the patient was improving a good deal and I have advised her to wait for some weeks to see if repair cannot be obtained without operation. Where, however, an extensive persistent x ray burn occurs

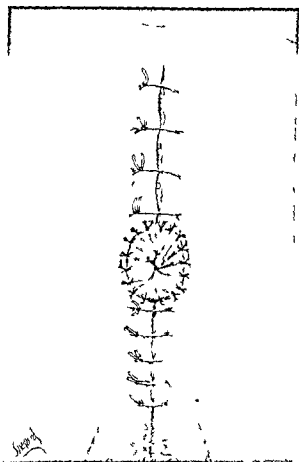


Fig 481 —x Ray burn of anal region. Closure with suture of mucous membrane of rectum to skin.

about the anus I believe that the operation which I have reported should be the operation of choice and that no colostomy or any extensive plastic is warranted. The operation might be modified somewhat, depending upon the size and shape of the burn but the general principles employed are evidently sound as shown by the splendid result in this case.

SUPRAPUBIC PROSTATECTOMY

Summary: Typical symptom-complex of prostatic hypertrophy, treatment preliminary to operation, suprapubic *versus* perineal prostatectomy, the suprapubic operation—control of hemorrhage, postoperative drainage, prognosis very good, carcinoma of the prostate—differentiation from simple hypertrophy—management; *uselessness of attempting removal of prostatic masses which infiltrate surrounding tissues*

THIS patient is a man of seventy-two, who comes to us with a simple hypertrophy of the prostate. The picture is the typical one that we meet with so frequently, that of a man in advancing years with frequency of urination, irritation with this frequency, associated with a great urgency to micturate, especially when the individual is chilled, and associated sooner or later with attacks of retention. This man has had two distinct attacks of retention, one about three months ago and one about a month ago, each lasting four or five days, when it was impossible for him to empty the bladder without the use of the catheter. He came to us the day before yesterday giving in general the clinical history which I have outlined. He is in fairly good general health and has always been a strong, rugged man.

On rectal examination I found a moderately enlarged prostate, rather regular in outline and elastic to the feel, and not giving one the impression of being carcinomatous. I then had him urinate, and immediately after urination passed a catheter and found that he had 7 or 8 ounces of residual urine. A stone-searcher gave no evidence of stone. I advised him to have the prostatic enlargement removed, and I shall do this this morning under ether anesthesia.

It did not seem necessary to make any preliminary preparation for the operation by draining the bladder either with a catheter or by suprapubic incision. I do this frequently where there is evidence of sepsis, but where the general condition is good I prefer to do the prostatectomy and follow it with the necessary

tion under my fingers I free with blunt dissection and my fingers the bladder for a diameter of about 2 inches so as to be perfectly sure that I do not pass through the peritoneum. Selecting a point about $1\frac{1}{2}$ inches above the prostate I plunge into the distended bladder a rather blunt pair of scissors (Fig 482 a). This is done under the direct control of the eye so that we are absolutely sure that we have mistaken no structure for the distended bladder. As the blunt scissors pass into the bladder a

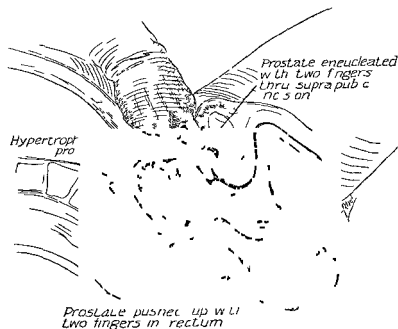


Fig 483 —B manual enucleation of the prostate

little fluid escapes. Then the closed scissors are opened and a superficial opening about $1\frac{1}{2}$ inches in length in the bladder wall is made (Fig 482 b). I now introduce my fingers into the bladder and feel a very large projecting middle lobe. I can feel no evidence of calculi. Now I have the orderly raise the left knee of the patient and putting some vaselin on my gloved left hand I introduce two or three fingers into the rectum and push the prostate well up toward the suprapubic incision. I now intro

duce the index- and middle fingers of my right hand into the suprapubic incision. I hunt for the internal orifice of the urethra with my index-finger. I now bore my index-finger through the mucous membrane and thin layer of fibrous tissue covering the prostatic hypertrophy and find the line of cleavage between the adenofibroma and surrounding tissue. Following this line of cleavage, taking plenty of time, I swing out the entire prostate by this bimanual method with one hand in the rectum and the other through the bladder incision (Fig. 483).

In the ordinary case a prostatectomy is very simple and the line of cleavage easily found and the prostate easily swung out. You see that it has taken but two or three minutes for me to enucleate this large prostatic mass, and you see that I pulled it out in one piece, consisting of the supposed lateral lobes and the middle lobe. The hemorrhage is not severe, and I control it by still keeping the left hand in the rectum and packing the space from which the prostate has been removed with a dry laparotomy pad. I keep this pad in position for six, eight, or ten minutes, during which time complete coagulation occurs in the ruptured vessels that have been injured, and I then slowly and carefully remove this packing and find no internal hemorrhage.

After this step of the operation I now change my gown and gloves and then sew a good-sized $\frac{1}{2}$ -inch rubber tube into the bladder incision. We have introduced a little surgical wrinkle that has proved to be of a good deal of value. We pick up the bladder with two bladder hooks and close the major part of the incision with two catgut sutures. I then introduce a third rather fine catgut stitch through the bladder wall and through the tube, so that when this is tied it fixes the tube firmly in the bladder (Fig. 482, *c*). The external incision is then closed with three or four sutures (Fig. 482, *d*). The wound is dressed with sterile zinc oxid paste so as to protect the skin of the lower abdomen from the irritating effects of the urine. The rubber tube is for a time attached to a rubber tube that runs into a bottle on the side of the bed or into a urinal between the patient's legs. We have had no serious hemorrhages in these cases except where the lesion was carcinomatous. We do not irrigate the bladder. I believe the

patients are very much better if they are not irrigated and if the bladder is not disturbed in any way. At the end of three or four days the rubber tube is rotated on its own axis several times until the fine catgut stitch gives way so that the tube can be removed. We feel that the patients are better if the tubes are removed on the third, fourth or fifth day rather than if the tubes remain longer. After the tube is removed the patient is dressed frequently with zinc oxid paste over the line of incision and a big copious absorbent dressing is employed and changed sufficiently frequently to keep the patient fairly dry. It is necessary to change these every three or four hours. The wounds heal on the average in fifteen to twenty days and the patients begin urinating normally sometimes as early as the tenth day as a rule however not until the fifteenth day. Occasionally a fistula persists for three or four weeks seldom more than four weeks.

We have had a surprisingly low mortality in these cases and outside of the carcinomatous cases and the patients who come to us septic there has been practically no mortality in our series. The septic cases must be properly prepared for operation and I am inclined to think from my experience that the best management is to do a suprapubic drainage under local anesthesia get rid of the sepsis and build up the patient until he becomes a safe surgical risk. In those cases where we have done a preliminary suprapubic drainage we do the prostatectomy as a rule ten days or two weeks later. I employ no cutting instruments of any kind and very frequently do the second step of the operation if the kidneys are at all involved under gas simply stretching the suprapubic drainage wound with two fingers entering the bladder and enucleating the prostate by the bimanual method which I have described. We do not use a drainage-tube in the after treatment of these cases at all and from the time of the operation employ simply a large copious absorbent dressing.

One cannot discuss these cases of prostatic hypertrophy without taking up at the same time the subject of carcinoma of the prostate because in such a considerable number of these cases we find that the enlargement is not a simple adenofibroma but is carcinomatous. Of course in the majority of cases this can be

determined before operation by rectal examination and by the general clinical picture. A rectal examination frequently absolutely determines the hard nodular character of the mass, the location of the mass from below the line of ejaculatory ducts instead of above it, and sometimes also evidence of the bone metastases that are found in these cases of carcinoma of the prostate. My own views in regard to the handling of these cases of carcinoma of the prostate are not thoroughly settled even in my own mind. We have had some very satisfactory results where we have done a prostatectomy, thinking that it was probably benign, but where we have found that the specimen showed carcinoma. Several of these cases have lived from a year to three years after operation in comparative comfort. I would say that where a large carcinomatous prostate can be readily enucleated in much the same way as a benign prostate, this operation should be done. On the other hand, where at the time of operation we find that the prostatic enlargement infiltrates all the surrounding tissues so that it cannot be enucleated, I question very much whether any operation is of service to the patient. These cases we have handled by making the operation either purely exploratory, allowing the suprapubic wound to heal, or in cases where necessity demanded, making a permanent suprapubic drainage. We have done some quite extensive operations for carcinoma of the prostate, but I doubt very much whether an extensive radical cutting operation for removing carcinomas of the prostate is worth while.

There is one note of warning I should like to sound, and that is: Whenever in a prostatectomy we find no line of cleavage and the prostatic mass infiltrates all the surrounding tissues so that it cannot be enucleated with any fair degree of force, one should, I think, accept at once the fact that it is inoperable and remove a section of the tissue for examination. It is too bad to persist to an unwarranted extent and tear out these infiltrating prostates with tremendous force because many of these patients will die from hemorrhage and from the great traumatism inflicted, and very few of them will be benefited by the extensive serious operation.

We have had some unusual complications following our prostatectomies, which I desire to mention. In one of our cases death occurred from apoplexy at the end of the fourth week. We have had several deaths from pneumonia, and we have had one case of a subacute destructive process in the hip-joint with a pathologic dislocation of the hip-joint following what seemed to be a very satisfactory prostatectomy, as far as wound healing was concerned. We have, however, in our service been surprisingly free from trouble from hemorrhage or from infection. Taken as a whole, I know of no more satisfactory operation than that of suprapubic prostatectomy for the relief of a patient who is suffering severely from obstruction.

CLINIC OF DR. C. HENRY DAVIS

PRESBYTERIAN HOSPITAL

CLINICAL TALK ON ANESTHESIA IN GYNECOLOGY AND OBSTETRICS

Summary Necessity of co-operation between surgeon and anesthetist, training the intern, forty cesarean sections under local—the technic, plastic surgery and local anesthesia, nitrous oxid-oxygen—type of cases permitting its use, relative safety of chloroform, ether, and nitrous oxid oxygen in pregnancy and labor, general conclusions—ether the standard anesthetic

THE master surgeon is familiar with the advantages and disadvantages of each anesthetic agent. His patients are individualized and the anesthetic chosen for the particular operation and the peculiar needs of the patient. It may be legitimate to have a hobby, but the surgeon who rides one cannot do the best for his patients.

A trained anesthetist is an important member of every operating team, but the surgeon, because of his broader experience, is better able to choose the anesthetic for a given operation. In borderline cases the anesthetic specialist should be consulted, but the surgeon must make the choice. The co-operation between surgeon and anesthetist is best when the surgeon is a capable anesthetist and the anesthetist has a good knowledge of surgical needs.

The training of the intern anesthetist presents a somewhat difficult problem, but it has been developed rather satisfactorily on the Gynecological Service at the Presbyterian Hospital. We have four interns and the service is divided into four quarters. The new man does the routine laboratory work, such as blood counts and urine analysis, acts as second assistant for private operations, delivers the multiparæ in the maternity, and is

taught to give anesthetics on clinical cases. During his second quarter he delivers primiparae in the maternity and is senior intern for the out patient obstetric work. During the third quarter he gives all the anesthetics for operations on private patients, assists the senior as necessary with dressings, history taking, etc. and makes the histologic examination of the tissues. As senior he acts as first assistant in all operations and under the direction of the attending physician cares for the gynecologic patients as well as pathologic cases in the maternity. This system gives a logical sequence to the training and it has certainly proved more satisfactory than any other tried in the past.

Ether, nitrous oxid, oxygen and novocain have been the anesthetics most commonly used during the past few years. Chloroform has been practically discarded. Rarely a few drops of chloroform are used to secure relaxation when it has not been secured with ether. Spinal anesthesia and the various sequences other than gas-oxygen ether have not been used. The personal equation plays an important part in choosing an anesthetic and we realize that it would not be possible for every operator to work with the same anesthetic in a given case. The following cases illustrate in a general way the choice of anesthetics for particular conditions.

Local Anesthesia —Dr. Webster did his first cesarean section under local anesthesia in 1909. With the introduction of novocain the results were more satisfactory and in 1915 Dr. Webster reported 13 cases which he had operated under this anesthetic. The writer did his first cesarean section under local and thus far has not used ether anesthesia for this operation.

Technic —The skin and superficial fascia are well infiltrated along the line of incision and to an inch or more to either side. A high incision with removal of umbilicus is the one of choice. The sheaths of the muscles are then infiltrated and the separated muscles exposed. Care must be given to the anesthetizing of the parietal peritoneum before it is opened, since it is very sensitive. With the abdomen open 1 c c of pituitrin is injected into the uterine wall in the region of the broad ligaments so as to lessen the danger of getting it directly into the fetal circulation. Blanch

ing of the uterus with a firm contraction usually occurs within a few seconds. With the edges of the incision pressed against the uterine wall a high anterior incision is quickly made in the uterus and the child delivered. The body of the uterus contains no sensory nerve-endings and, therefore, requires no anesthetic. The uterus, stimulated by the pituitrin, contracts and retracts, so that the operation is relatively free from bleeding. The uterine incision is now sutured with three or more layers of iodine catgut, care being taken to secure good approximation and avoid dead spaces. The last layer turns in the raw peritoneal edges. The abdominal incision is closed in the usual manner, care being taken to bring the muscles together so as to correct the diastasis. Usually no more anesthetic is needed for the closure. Quinin and urea hydrochlorid has not been used.

These patients should suffer little or no pain during the operation but there is the constant anticipation of getting hurt, and we find it advisable to keep cold cloths on the forehead and have an intern or nurse talk to them constantly about subjects other than the operation. Since 1915 we have combined the nitrous oxid-oxygen analgesia with the local anesthesia. This deadens the power of thought to a slight degree as well as the sensations of pain, and it has undoubtedly lessened the possibilities of surgical shock. About 40 cesarean sections have been performed under local anesthesia or the combined local anesthesia and nitrous oxid oxygen analgesia by the Gynecological Staff of the Presbyterian Hospital, the greater number having been performed by Dr. Webster. The writer has performed 3 with the combined anesthesia during the past two years.

Plastic operations, such as repair of cystocele and rectocele or amputation of the cervix, are readily performed under local anesthesia. In some cases the operation would have been too dangerous with any other anesthetic. For instance Mrs. L., aged twenty three, entered the Presbyterian Hospital March 21, 1916. She had exophthalmic goiter and marked circulatory disturbance. But the thing which brought her to the hospital was the usual symptom complex resulting from a large rectocele and cystocele with retroversion and moderate prolapsus uteri.

Her mental attitude was such that the vaginal condition had to be treated preliminary to that of the goiter. With the infiltration of a $\frac{1}{2}$ per cent novocain solution I amputated the cervix and repaired the cystocele and rectocele. The patient stated that she felt no pain or discomfort other than that from the lithotomy position and she certainly showed no ill effects from the operation. Some weeks later Dr C B Davis removed one lobe of the thyroid under local. This patient was so pleased with her treatment that in the personal column of a newspaper she thanked the doctors and hospital for the care given.

The secret of success with local anesthesia depends on having a *sterile* solution and properly infiltrating the tissues. But the psychology of the patient must always be thought of both before and during the operation. While we have performed all sorts of gynecologic operations under local anesthesia and believe it most desirable in some cases it has very definite limitations. The field of local has been broadened by combining it with the nitrous oxid oxygen analgesia.

Nitrous Oxid-Oxygen—Drs Webster and Bevan of the Presbyterian Hospital were among the first to use nitrous oxid in major surgery. But its limitations are such that they soon gave up the hope of using it as a practical substitute for ether. Dr Bevan returned to the former practice of using the gas for examinations and short operations while Dr Webster for many years used nitrous oxid oxygen alternately with ether in most of his major surgery. More recently he has used the nitrous oxid oxygen ether sequence with very satisfactory results.

The writer has had considerable experience both in administering and operating with nitrous oxid oxygen alone and combined with ether and from his experience questions the advisability of attempting to do very much major surgery under nitrous oxid oxygen anesthesia. At present we have practically limited gas anesthesia to examinations and short operations such as dilatation and curetage colpotomies etc. When ether is contraindicated because of some kidney or bronchial condition the nitrous oxid oxygen may be combined with local anesthesia.

Nitrous oxid oxygen analgesia has been popularized in ob

stetric work, and thus far has not been employed to any extent in gynecology. I have tried it experimentally in plastic cases and believe that for some women it may be used satisfactorily during such operations as dilatation and curetage, amputation of the cervix, repair of cystocele and rectocele. One morning I used it for this type of work on two successive patients with excellent results. The first woman kept up a conversation with the intern during the entire operation, and only once did she complain of pain. The test was perhaps more severe in the second case, since she was a Greek and did not understand English. A few weeks later at another hospital I did similar plastic work on a physician's wife, the analgesia being administered under my direction by an intern who had no previous experience with the gas machine.

The surgeon who would use nitrous oxid oxygen must familiarize himself with the contraindication to its use, as well as its limitations. It is not well borne by the very young or the aged. Respiratory difficulties are the most important contraindications. If the necessary relaxation cannot be secured without causing cyanosis the writer believes the nitrous oxid oxygen should be given with a higher percentage of oxygen and ether sequence or completely discarded in favor of the ether. *Cyanosis is the most important danger sign of nitrous oxid anesthesia and should never be permitted to occur.*

During the past few years we have been particularly interested in the choice of the anesthetic during pregnancy and labor. In cases of toxemia both chloroform and ether are known to increase the maternal danger. Some twelve years ago Dr Webster began using nitrous oxid oxygen in this type of cases. The results were so satisfactory that he gradually broadened its use to all types of operative obstetrics. The routine use of the nitrous oxid oxygen analgesia in normal labor is of more recent development, and with its more general usage has arisen a few questions regarding its safety.

Last winter the writer conducted a series of experiments on guinea pigs in the attempt to secure additional information regarding the relative safety of chloroform, ether, and nitrous oxid

oxygen in pregnancy and labor The anesthetics were all given in a vaporous or gaseous condition to groups of pregnant and non pregnant guinea pigs These experiments were described in some detail before the Chicago Gynecological Society, May 18 1917, and will be published in Surgery, Gynecology, and Obstetrics The correlation of these experiments and clinical observations seemed to justify the following conclusions

1 The administration of chloroform, ether, and nitrous oxid oxygen to pregnant or non pregnant guinea pigs, if given over long periods and repeated on successive days causes degenerative changes in the tissues The changes found in the liver are the most constant Those following the use of chloroform are the most severe

2 If the degeneration is not sufficiently great to cause death the animal gradually recovers from the effects of the anesthetic, but it seems probable that the results of the injury may persist for a considerable time

3 With ether and nitrous oxid oxygen the changes are chiefly those of cell asphyxiation, yet it is evident that the cells recover more slowly following ether than they do after nitrous oxid The central necrosis following chloroform is very different from that seen in asphyxiation and more permanent

4 The long continued use of these anesthetics must be considered dangerous to the fetus *in utero* Chloroform and nitrous oxid anesthesia seem more dangerous to the fetus than ether Continuous nitrous oxid oxygen analgesia while less dangerous than the anesthesia, should not be administered over long periods

5 The marked fatty degeneration of the livers in all three of the young born after their mothers had only one hour of chloroform-oxygen anesthesia shows that pure oxygen does not remove the danger of chloroform

6 The changes following the use of nitrous oxid being identical with those seen after ordinary asphyxiation, it seems fair to believe them due to long continued interference with cell oxidation

7 There is no reason for believing that the intermittent use of four or six inhalations of nitrous oxid oxygen at the beginning

of the uterine contractions can be of any material danger to the fetus. The nitrous oxid absorbed has been largely eliminated by the end of the contraction, and normal metabolism is not disturbed during the interval.

8. Since it is evident that anesthesia during pregnancy may be a source of considerable danger to the fetus, it is believed that operations should be avoided, if possible, during this period. The fetus *in utero* and the newborn would appear to stand ether *anesthesia* better than chloroform or nitrous oxid-oxygen.



CLINIC OF DR FRENCH S CARY

COLLEGE OF MEDICINE, UNIVERSITY OF ILLINOIS

STUBBORN CYSTITIS

Summary Necessity of proper diagnosis in suspected cystitis—essential rôle of the cystoscope surgical treatment causes of stubborn cystitis

THE resistance of cystitis to treatment may be based on conditions in the bladder proper or to complications arising outside of this viscus

A foreign body in the bladder, after cystitis has developed, will maintain this pathologic condition in spite of all therapeutic measures until the extraneous body is removed. The intake of irritating substances via the alimentary canal will, to a certain degree, interfere with the effect of local applications, but such conditions are easily detected, and it will remain to discuss other conditions that do not force themselves so easily on the mind of the observer.

But two conclusions may already be drawn from these preliminary remarks. First the local conditions must be thoroughly investigated, second, the general condition and behavior of the patient must also be the object of a complete analysis. Unfortunately, it is still the custom in many quarters to accept the diagnosis of cystitis on the mere presence of pus in the urine, and on the so called classic subjective syndrome of cystitis, that is pain in the bladder region, dysuria, and turbid urine.

The patient is then subjected to the routine flushing of the bladder, and only when the symptoms persist for a long time or become aggravated is a thorough examination thought of. This method is fraught with several drawbacks, not only is the patient not relieved after having been tortured by futile treatments, but the underlying conditions may have become so firmly

established as to make a real cure more difficult. We know, or ought to know, that the above mentioned syndrome may be caused by conditions other than cystitis, such as pathology in the posterior urethra, in the prostate in the seminal vesicles, in the kidney, and in other structures which happen to become inflamed and secondarily attached to the bladder wall. It therefore becomes imperative not to make the diagnosis of cystitis unless convincing evidence of this condition is established, and this can only be accomplished by an ocular inspection of the bladder wall. In females additional information may be gained by palpation which is particularly instructive, and x-ray investigation may also help in the diagnosis. What are the changes in the bladder wall that are apt to cause and maintain a stubborn cystitis? Foremost under this heading we must quote ulcers with extension of the inflammation into the deeper layers, thus leading to extensive infiltration, then involvement of the lymphatic tissues in the trigonum, and traumatic granulomata.

It is a matter of experience that the cystitis surrounding a suppurating defect in the bladder wall will not heal until the ulceration has been made to become epithelialized. This again impresses on one's mind the importance of cystoscopy. There is no way of ascertaining the presence of an ulcer and determining its character other than by the ocular investigation of the interior of the bladder. At the same time the rational therapy of such an ulceration is carried out most successfully by endovesical therapy. The bottom of the ulcer is curetted out and cauterized by means of a galvanocautery introduced through an operating cystoscope. After the ulcer has once healed following this instrumentation a few applications will cure the concomitant cystitis which up to this time has resisted all therapeutic efforts. It may not be amiss to mention on this occasion that flushing out of the bladder is not of great therapeutic value for the cure of a cystitis. Its only advantage lies in the cleaning up of the inflamed mucosa, making the mucosa more accessible to the effect of the small quantities of more concentrated solutions the so-called healing drugs which are introduced. It has to be mentioned though, that if a cystitis is maintained by syphilitic

efflorescence, a not uncommon occurrence, a cure will only be obtained by general antiluetic treatment. The diagnosis of such specific pathology is made by the characteristic aspect of these prominences—they are typical broad condylomata—and by other signs of syphilis in the body.

If the infiltration of the bladder wall has become very extensive, only operative interference will furnish a satisfactory result. The diagnosis of such infiltration can easily be made by the reduced capacity of the viscus, this is marked not only by the frequency of the painful urination but also by the firm resistance offered by the bladder against the attempt to distend it to the normal degree by injecting fluid into it. The mucosa deprived of its sheen gives the impression of rigidity, and numerous submucous hemorrhagic patches testify to the intensity of the engorgement. The therapy in such cases consists in suprapubic cystotomy, freely splitting the bladder wall. Three indications are answered by this procedure: first free drainage, second, the unburdening of the bladder wall and relief of the inflammatory tension, and finally, the capacity of the viscus will be reestablished by the addition to the bladder wall furnished by the new roof constructed out of the fibrous tissue that finally will close the granulating wound. It is quite obvious that in such cases drainage by a perineal boutonniere will not be sufficient. In cases where the lymphatic tissue underneath the trigonal mucosa becomes involved by this inflammation the condition is revealed to the eye of the cystoscopist: the trigonal mucosa appears to be studded with very fine granula, each of them surrounded by a red areola, and around the internal urethral orifice there appears numerous proliferations of a very dark hue. This kind of cystitis is, as a rule, of a very stubborn character, and in most instances yields only to a thorough curetage of the involved area, this interference is carried out through the operating cystoscope, or in females it can be done by introducing a small intra uterine curet through the urethra into the distended bladder, and by controlling the action of the instrument with a finger placed in the vagina.

If the bladder, while in a state of inflammation, be subjected

to trauma of some severity, a vicious circle which will maintain the cystitis may be established in the following way a crack produced in the inflamed mucosa by the trauma stands a very poor chance of healing, and, as a rule, luxuriant granulations will sprout up the decay of these preventing the inflamed mucosa from returning to normal condition. Here, again the rational therapy consists in scraping off these granulomata and cauterizing the base, both procedures to be carried out by means of the operating cystoscope. It has been mentioned before that if a foreign body is once introduced into the bladder, and has produced a cystitis, that the latter will not heal until the foreign body has been removed, such foreign bodies may be introduced through the urethra, or silk ligatures may immigrate into the bladder, or concretions may be formed as a result of the stagnation of infected urine. The removal of these is the first step for successful handling of such a case. Another species of pathology causing and maintaining cystitis is a diverticula of the bladder wall. If one considers for a moment that most of the diverticula are bottle shaped it will not be surprising to know that free drainage of this accessory cavity cannot take place, and that the contents of this sacculation are always in a state of decomposition, not only infecting the wall of the diverticulum but also exerting the same damaging influence on the balance of the bladder wall. A cure of such a case of cystitis will depend on the removal of the cause, that is extirpation of the diverticulum. Irrigating the bladder in such cases will furnish only temporary alleviation. Among the inflammatory conditions of adjacent organs that play a prominent rôle in various types of stubborn cystitis must be mentioned infection of a patulous urachus. The diagnosis is made by the cystoscope, and the cure consists in amputation of this hollow strand. Pus tubes or parametric exudates becoming attached to the bladder wall cause cystitis *ex contiguo* and the cystitis remains until the removal or drainage of these *infectious accumulations* is obtained. The *inflammatory infiltration* of the bladder wall is demonstrated by the appearance of the so-called bullous edema of the mucosa. It is very evident that if once cystitis is established due to gonorrheal infection this condition

will remain until the posterior urethra and prostate are cleaned up, and if obstructions to the urinary flow are present these must also be removed. A urethral stone impacted in the parietal part of the urethra may also produce and maintain a circumscribed cystitis until the stone is removed. Tuberculosis of the bladder and kidney and pyonephritis may also be the cause of a circumscribed stubborn cystitis.



CLINIC OF DR. CARL BECK

NORTH CHICAGO HOSPITAL

TEMPORARY ENTEROSTOMY

Summary Three cases illustrating the value of enterostomy as a vent for gas and feces in protecting suture lines further down the bowel, type of cases in which such a vent is necessary

A TEMPORARY enterostomy occasionally serves a very useful purpose, and it is my present intention to discuss the subject with you, illustrating my remarks by means of the records of 3 patients whom I have had under my care during the last few months. The record of the first patient reads as follows:

A G, an Italian laborer of more than middle age, ate a very heavy breakfast and went to work. While lifting a railroad tie with one of his fellow workers the man dropped his end of it and the other end struck the patient in the abdomen. He immediately had very severe pain, vomited, and was taken home in a shocked condition, with a rapid, thready pulse. He had had a double inguinal hernia for many years, which had not bothered him very much and for which he had never worn a truss. Through abdominal pressure he pressed some of the abdominal contents out into his hernia, and when my assistant, whom I sent out for the purpose, examined the patient about two hours after the injury, not being able to get a history, he thought that the hernia was the cause of the trouble, and that the incarceration of the hernia was responsible for the vomiting and other symptoms. The patient was brought to the hospital shortly afterward. The abdomen was extremely tender and very rigid, and while his pulse had rallied somewhat and was less frequent, there was something about his face which told me that there was an intestinal perforation, it was the expression

of anxiety coupled with the frequent eructations and the absence of a bowel movement. There was also on one side of the abdomen more tympany than we could account for in a distended bowel and I took it for free air in the peritoneal cavity. After watching him for a few hours he was operated on at 3 P. M. of the same day.

I found the abdomen filled with a flaky fluid slightly yellowish in color and of the nature of duodenal contents. The intestines were in a congested condition, distended and presenting the characteristic pathologic appearance of a general peritonitis following perforation of the intestine. After a short while the perforation was found midway between the ileum and jejunum. It was an oblong tear with an everted mucosa and with only a small opening in the mucosa. I mopped out as much as I could of the fluid and sutured the perforation. I intended at first just to drain the peritoneal cavity but on second thought I made an enterostomy above the location of the tear. Perhaps I might have sewed the rent itself into the abdominal wall but I preferred an entirely fresh portion of the bowel for this purpose well above the lesion. I also drained the peritoneal cavity at a point somewhat below the site of the enterostomy (Fig. 484). The patient rallied and made a very good recovery. About three weeks after the injury we were able to suture the enterostomy without leaving the slightest defect in the abdominal wall. Some three months later we were able to make a radical operation for the cure of his herniæ and now the man is well and back at work.

During the past five years I have had a number of cases of intestinal operations belonging to a class which formerly gave the highest mortality and which through the application of the simple device of enterostomy have almost all been cured.

Operations on the intestinal tract are practically harmless if we have to deal with normal bowel and normal peritoneum. The technic of the operation is so perfectly developed that we can depend upon the success of the same. The bowel itself has the greatest tendency to unite if severed. I remember an instance in which a beginner in abdominal surgery had the mis-

fortune to sever the small bowel. On discovering the accident, *not knowing the technic of intestinal suture very well*, he put four interrupted sutures through the walls of the transversely severed bowel, and the patient made an uneventful recovery without even a fistula. It was a normal bowel.

This is the explanation for the many successful gastro-enterostomies and entero-enterostomies which are done every

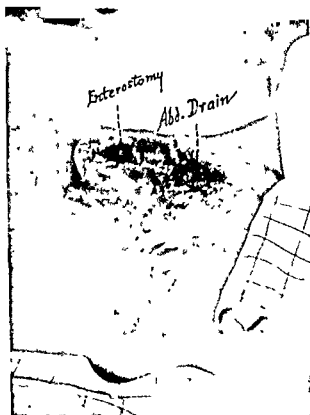


Fig 484—Enterostomy of the healthy ileum above the site of perforation, drainage tubes below, draining general abdominal cavity

month These are cases in which there is no pathologic condition at the site of operation Quite different is the condition when we have to make our anastomosis between loops of bowel which are themselves diseased, as, for instance, in the resection of an incarcerated bowel where the loops have been the seat of marked passive congestion for some time, or in a case of perforation of the bowel where the intestinal contents have pro-

within the healthy tissue under the guidance of the eye in a somewhat atypical manner. The patient was placed face downward with the buttocks elevated. An incision was made over the coccyx and the coccyx removed. The incision was then carried through the sphincter clear into the rectum. Every blood vessel was caught as it was cut and the two borders of the incision were held apart with threads. Thus opened the rectum to our view and the area of the infiltrating ulcer presented itself. It was somewhat to the left of the median line about 2 inches above the mucocutaneous junction. The ulcer was excised making all incisions in healthy tissues. All the vessels were caught and the various layers of the incision approximated by suture with great exactitude. Then the posterior incision through which the rectum had been opened to our view was closed by continuous catgut sutures. The skin was brought together with sutures of silkworm gut. A small strip of gauze was left in the upper wound. The patient was then turned on his back and a right cecal colostomy was made with a view to draining the bowel fully through the colostomy thus giving the wound in the rectum a chance to heal.

On the day following the operation the colostomy was opened and a rubber tube sutured into the bowel. The patient made an uneventful and absolute recovery. The sutures healed by primary union. Most of the fecal matter drained through the colostomy. There was very little discharge from the coccygeal region and after a few days it closed.

On March 1st the colostomy was closed by inverting in the usual manner under local anesthesia. The wound healed by primary union within a week.

On March 15th the patient who now had regular daily bowel movements and absolute control of his sphincter was examined proctoscopically and a linear scar was found at the place from which the ulcer had been removed.

Microscopic examination of sections from the ulcer proved it to be a carcinoma. The patient left the hospital on March 15th perfectly cured.

CLINIC OF DR. FREDERIC A. BESLEY

COOK COUNTY HOSPITAL

FRACTURES

Summary Responsibility involved in the care of fractures, definition, classification, and etiology, the repair of fractures, fate of bone-transplants

Case I Differential diagnosis between sprain of the hip and fracture, eight points in the diagnosis of fractures, fear of hypostatic pneumonia in fracture of hip unwarranted provided pain is prevented

Case II Multiple bone cysts with pathologic fractures, the intramedullary bone-splint

Case III Old fracture of the humerus with injury of the brachial plexus, the pernicious board splint

Case IV Ecchymosis as a sign of fracture, the pathology of blebs

Case V Fracture-dislocation of the elbow, functional vs anatomic results, importance of the fluoroscope in difficult cases

Case VI Compound fracture of femur, free drainage the secret of success in the management of acute suppuration

Case VII Fracture of fibula, fallacy of the fracture-box, the blanket ham mock, when to apply the permanent splint

Case VIII Fracture of femur (intracapsular), extension in fractures—the Steinman method

THIS morning I am going to take up with you a discussion of the general features of fractures. The responsibility of the physician or surgeon who assumes the care of a fracture cannot be overestimated or overstated. There is no one condition that I know of in the whole field of medicine or surgery that involves so much responsibility on the part of the physician in charge. In fact, the responsibility has seemed so great to some good surgeons throughout the West that they have refused not only to care for a fracture, but to see a fracture in consultation. That gives you some idea of the responsibility involved in the care of fractures as many surgeons see it. Many years ago I used to be glad to take care of a fracture. At the present time I wish I had never seen a fracture.

That brings up the question, What is a fracture? There are several definitions. Thus, I think, is the definition of Gross. A fracture is the loss of continuity of a bone or cartilage due to direct or indirect violence or to muscular contraction. Fractures have been divided or classified on many bases. A fracture is either complete or incomplete. Of the incomplete fractures, there are the depressed, the splintered, and the so called "green stick" varieties. According to another classification fractures are divided into the simple and the compound. By a simple fracture we mean a fracture without severe laceration of the soft tissues and particularly without breaking the skin. A compound fracture is one in which the overlying soft tissues are so involved or lacerated as to admit of the exposure of the fracture to the air. Get that clear. In no sense is a fracture compound unless the fragments are exposed to the air. Another classification is based on the direction of the line of fracture with reference to the long axis of the bone. A fracture may be transverse, spiral, or longitudinal. It may be a perfectly transverse fracture, an oblique fracture, or it may be designated by any term that will describe its relation to the shaft of the bone.

Another classification is based on how the fracture is produced—whether it is due to indirect violence or to direct violence. That brings us into the realm of the etiology of fractures. Fractures occur more generally in men than in women because men are more exposed to injury. They occur most commonly between the ages of twenty and forty. There are certain predisposing factors among which may be mentioned old age. Fewer fractures occur in children than in old people. Then there are certain conditions of the bone that must be considered among the predisposing factors, such as inflammatory processes, cysts, and tumors. When a fracture occurs in bone of this type, it is known as a pathologic fracture. It may follow violence of a very slight degree. Sometimes turning in bed will produce such a fracture. Trophic disturbances such as occur in syringomyelia or tabes, may also be factors in producing the fragility that renders bone more easily fractured. *Fragilitas ossium* a condition seen in some children, you are familiar with. It is now thought that some

cases of fragilitas ossium are due to a fault in the functional activity of the thyroid gland.' Calcium metabolism is probably controlled by the thyroid secretion, and when that secretion is interfered with the bones may become fragile and be easily fractured. Children who have had nine, ten, up to eighteen fractures have been treated with thyroid extract with favorable results.

A word might be said here about the repair of fractures. A fracture, it seems to me, heals by granulation just as any tissue heals by granulation. Let us see what happens when we have a simple fracture. The bone is fractured. This represents the medulla, this the medullary canal, and this the periosteum (drawing). When the bone is fractured, what happens? First there is more or less tearing and laceration of the tissues. The extent of the laceration depends entirely upon the extent of the fracture. Let us assume that the bone is broken transversely, the periosteum is torn, the Haversian canals are ruptured, and the medulla is torn across. This disruption is accompanied by a tearing of the soft tissues. Immediately there is an extravasation of blood, first, from the ends of the bone, and second, from the tissues around the bone. The amount of extravasation depends entirely upon the amount of laceration of the soft tissues, the degree to which the bone may be crushed, and the extent of the separation of the ends of the bone. The second stage is that of clot formation, and in the third stage the adjacent living cells begin to proliferate. From the histologic and physiologic evidence now at hand I think we may assume that the periosteum, the endosteum, and the cells in the Haversian canals all take part in the repair of fractures. The callus, consisting at first of blood-clot, is gradually transformed by the invading granulations into osteoid tissue, and then, by the addition of calcium salts in response to the specific functional activity of the osteoblasts, into true bone. In its early stages the callus is superabundant, but if allowed to undergo its natural development, free from the disturbing influences of infection, excessive motion, or general disease processes, it shrinks to the size best compatible with functional demands, and eventually assumes the histologic structure of the bony shaft of which it is a part.

Before we take up these individual cases let me say a word concerning the fate of bone grafts. The fate of bone transplants is so intimately connected with the question of bone repair that you cannot separate them. Ollier was the first to make the statement that a bone graft was useless without periosteum. If my recollection is correct that was in 1869 or 1870. In 1890 Barth by a large number of experiments showed that the bone graft did not live no matter whether it was an autogenous graft from the same individual or a graft taken from someone else. It died regardless of whether it had the periosteum connected with it or not. He maintained as did Dr. Murphy all his life that a bone-graft was merely a scaffolding over which new bone grew and over which new blood vessels traveled. Barth has lately within the last few years changed his opinion. Axhausen in 1907-08 went back to the original theory of Ollier. That theory was that the life of the bone-graft was dependent upon the periosteum and without the periosteum it would not live. Macewen in his great work seems to think that the periosteum plays only a minor part in the repair of fractures and in the grafting and transplantation of bone. Out of all this confusing mass of literature and out of all this confusing mass of deduction what can we say from the practical side? In regard to bone grafting we may say that it is a good thing and that a bone graft with or without its periosteum with some endosteum and with some cancellated bone placed in such contact with living bone or living tissues that its blood supply may be preserved in some measure and so related to surrounding structures that a functional demand is made upon it will survive. It is not right to draw conclusions concerning the viability of bone grafts from the results in the cases of grafts that were so placed as to be without function. For the same reasons the changes occurring in periosteum transplanted with or without a pedicle into soft tissues does not have any weight in our final deductions. If you will think of the ordinary conditions that pertain in your experimental work on dogs and in your clinical work on patients you will agree with me that there is very little if any of the bone graft that gets sufficient blood supply to keep any of the tissues growing. When you put in a

bone-graft that much of the graft lives, whether it has periosteum or not, that gets immediate and free blood-supply. It is my belief that in any bone-graft if you find that some of the periosteal tissue lives and reproduces bone it is because that portion of periosteum achieved an early vascular supply, and the same statement applies to the cells in the lacunæ and in the marrow spaces.

Now let me say just one more word about the production of the callus, the permanent callus, as it is spoken of in text-books. That term is to be disregarded. There is just one callus. The primary callus is larger than the permanent callus because nature throws out an excess of material apparently in order to facilitate repair, and then proceeds to cause the resorption of the excess, leaving only that which is functionally necessary. The osteoclasts—and we will assume that the osteoclasts are the cells that destroy the bone—digest and remove the unnecessary callus. To summarize: first there is the fracture, and then, in the order named, oozing, clotting, cellular proliferation, calcification, and removal of excess callus.

CASE 1. SPRAIN

This patient presents a rather striking though not uncommon condition. Twelve years ago she had a fracture of the neck of the femur. She had a fairly good result from treatment at that time, as we assume from the fact that she has been getting around on the limb quite freely since. She is back now with a history of a slight injury and some pain and disability in the joint. The x-ray shows an apparent line of fracture across the neck of the femur, with a separation of the fragments of at least $\frac{1}{4}$ inch. There is no evidence of impaction. Now I should like to present this as a pathologic fracture occurring at the site of the previous fracture in which there had been some rarefaction of the bone and some failure of union, but from the appearance of the x-ray I cannot say that, because there is very good compact bone with very little rarefaction on each side of this line of apparent fracture. Therefore, I believe that if this is a fracture it must have resulted from a degree of violence which would have produced a fracture even if the bone had not been fractured twelve years ago.

But so far we have studied but one aspect of the case, and clinically there is nothing one should more assiduously avoid. Here is the patient. She suffered the present injury only a week ago. I wonder if she really has a refracture, or if that apparent solution of the bony continuity disclosed by the x ray does not indicate merely the old line of fracture which is the seat of fibrous, not bony, union?

On making a diagnosis of fracture generally speaking, the first thing one gets is a history of injury, usually a violent injury. Next we inspect the injured part and take note of any local deformity, malposition, ecchymosis or swelling. Then we may palpate the injured region in an endeavor to locate a false point of motion and crepitus. We used to depend upon crepitus very largely to make a diagnosis of fracture. I should like to state that I think it is five or six years since I felt crepitus that was intentionally elicited. Do not feel for crepitus and do not feel for a false point of motion if you have access to an x ray. The sixth point in the diagnosis is loss of function. Wherever there is a fracture of bone there is associated loss of function. Seventh, we search for a point of local tenderness. This is usually easily located on subcutaneous bones and is surprisingly definite, painful on pressure and well localized. It is a factor of great value. Eighth and most important is the x ray picture. The best x ray pictures are those taken in pairs at direct right angles to each other or stereoscopic pictures. I prefer the stereoscopic pictures. A single picture is of no value except to tell you that a fracture exists and it may even fail to do that. I divide the factors concerned in the diagnosis of fractures into the following three groups, arranged in the order of their importance. First, the x ray; second the physical examination; third, the history. Usually a probable diagnosis can be made upon any one of the three factors and a positive diagnosis by either of the first two, but in doubtful cases all three should be given due attention.

In the present case our diagnosis from the x ray is fracture probably as the result of considerable violence but in checking up the history we find no support for this assumption and physical examination yields none of the general signs of fracture. We

are forced to conclude, therefore, that when the patient fell she overstretched or tore some of the soft tissues in such a way as to render the hip painful and to limit its functional capacity. A patient with a fracture of the neck of the femur is never able to move it as much as this patient is able to move hers. As you see she has it under fair control. If this hip really were fractured what picture would be presented here? We would find that this woman could not use her limb at all and that all attempts at active motion would be associated with severe pain. On inspection, the limb would be found lying relatively helpless, in marked eversion and the tip of the great trochanter would be $\frac{1}{2}$ to $1\frac{1}{2}$ inches above a line connecting the anterosuperior spine of the ilium and the tuberosity of the ischium—the Roser-Nélaton line. These facts alone would probably be sufficient to establish the diagnosis.

Why is this woman put on a back rest? The intern tells me it was done in order to prevent the hypostatic pneumonia that occurs in old people and especially in this class of cases. Patients of this type are thought not to stand confinement in bed very well. I would like to say that I think our teachings have been a little wrong in that regard. We have been afraid to keep these old people in bed without justifiable clinical evidence to the effect that it does any harm. Frankly I have seen a great many old people with fractures of the femur and I do not recall but one who got a hypostatic pneumonia. I do not recall but one in which I could say that confinement in bed affected the general health. In fact I have seen many of these patients do pretty well in bed particularly if they were relieved from pain. I think that relief from pain is of more value in preventing this complication than anything else. We are putting these people up on back rests largely because our fathers did and because we have not yet learned that pain, and not recumbency is the enemy to be conquered.

CASE II FRACTURE OF FEMUR

This is an unusual condition. In this case we find multiple fractures in a femur which shows distinct pathologic changes which antedate the fracture. Here in the neck and in the tro

chanter we see areas of rarefaction rarefaction that is probably due to a so called fibrocystic inflammation We are coming to believe that most bone-cysts are due to an inflammatory process The bone cysts we see in long bones are not true cysts since they have no epithelial or endothelial lining The adamantine and the dentigerous cysts occurring in the jaws are true cysts in the bone with an epithelial lining These cavities are not They are the result of a localized rarefying osteitis with bone destruction and replacement fibrosis of the destroyed osseous tissue Usually these cavities in bone are not empty but contain a cellular fibrous tissue sometimes with many giant cells and with the older lesions a lining of adult fibrous tissue with a core of liquid

This patient fell down a flight of stairs step by step She sustained a fracture of the femur at the neck a fracture at about the middle of the femur and a third fracture just a little below the middle of the femur You will note from the x ray picture that there was considerable separation of the fragments and that there was also marked deformity

This patient has been operated on and the wound has healed by first intention Only the two lower fractures were handled at operation since the fracture in the femoral neck was impacted and therefore semisplinted in position She is evidently doing very well At the operation intramedullary bone splints were introduced I believe that the intramedullary bone splint is the best means of fixing in case of fracture the fragments of bones which have a central canal I think however that dead bone from an ox is just as suitable for this purpose as bone taken from the tibia of the same individual I make that statement knowing that it is open to criticism and perhaps justly so I make that statement because I do not believe it possible to put in an intramedullary splint even though it be autogenous in such a way that any of the bone cells will get a sufficient blood supply to enable them to live I do not believe that a medullary splint lives as new bone I am not sure that we want it to live as new bone An intramedullary splint holds the ends of the fragment in accurate apposition and repair goes on just as it goes on at the original site of the fracture Whenever you put

bone into the medullary canal it is necessary to ream out the canal, and in so doing the endosteum is destroyed. The blood-vessels are likewise destroyed in that reaming-out process. A clot forms between the intramedullary splint (no matter whether it is autogenous or taken from an ox) and the endosteum in such a way as to preclude the early coming through of cells and nutriment to the graft, so that finally it is always absorbed.

CASE III. FRACTURE OF THE HUMERUS—PARALYSIS

This is an old fracture. This splint is put on for the purpose of illustration; it is put on to show you what not to do. The essential thing in the treatment of every fracture, of course, is the diagnosis—the diagnosis of the location of the fragments, the diagnosis of the position of the fragments, the diagnosis of our ability to perform the reduction, and the diagnosis of the position of the fragments after we think they are reduced. The text-books say in discussing the treatment of fractures that the fragments should be reduced as early as is consistent with good work and then held in position simply and easily. You will agree with me that there are text-books with pictures of this sort of apparatus. Every one you look at is the same. Here we see two boards, padded with cotton wadding, bound, one on the dorsum and the other on the ventral surface of the forearm, extending from the elbow nearly to the tips of the fingers. This is given as a method of treatment for Colles' fracture, for fracture of the lower end of the ulna, and for fracture of both bones of the forearm. I am perfectly willing to stand by the following statement: If all the fractures of the lower end of the radius I have ever seen, the so-called Colles' fracture, had never been seen by a physician or a surgeon, they would have given better results than were obtained. I mean by that just this, that in many of those cases the fracture was not reduced, and the means which were employed to hold the fragments in place did more harm than the primary wound would have caused if it had been left unmanipulated. Why? A Colles' fracture is usually an impacted fracture. There is very little tearing or laceration of the soft tissues after the primary wound. There is very little inflammation after the

primary wound. There is usually very little deformity in the bone itself. What happens? The physician attempts to reduce it without an anesthetic, a thing which can rarely be done perfectly. Then because the reduction does not look perfect, a firm board splint is put on and an attempt made to squeeze those fragments into position. What happens? The board interferes with the circulation so grossly that ischemia of the soft tissues on the palmar surface of the arm is produced, leading in turn to replacement fibrosis with cicatricial contraction from which the useless claw hand of Volkmann results. The ischemia may also involve the wrist joint, including the periarticular structures, thus alone being sufficient to produce more interference with the function of that wrist than the primary fracture itself. I appreciate that I have made a broad statement and one that is open to criticism, but it is based on an experience with a large number of cases spread over a long period of years, mostly in the Cook County Hospital. A board splint should never be used except as a temporary means of immobilization while transporting the patient. It has no place in the treatment of fractures. A board splint cannot be padded. I make this as a broad positive statement. A board splint cannot be padded so that it will fit the conformation of the part in such a way as to hold the fragments and at the same time not produce pressure enough to interfere with the circulation. When a bone is healing, what is the most important factor in the union of that bone? What are you trying to obtain? A good circulation. Can you obtain that when you are compressing the lymphatics? No. Are the lymphatics important factors in the nutrition of bone? Yes, very important. Does the splint interfere necessarily with the deep blood circulation? Possibly not, but it does interfere with the lymphatic circulation, and interference with the lymphatic circulation interferes with the nutrition just as much as interference with the blood circulation. Why? Because interference with the lymphatic circulation blocks the return circulation from the capillaries. The swelling that follows the manipulation incident to the fracture and its reduction makes the board splint fit more tightly, and the more tightly it fits, the greater

becomes the circulatory obstruction, thus producing a true vicious cycle

This man has a fracture The picture shows a healed fracture in the lower end of the ulna and a healed fracture in the lower end of the humerus Both have healed without deformity, and the patient comes to us now complaining of his inability to extend his hand and fingers and to supinate the forearm In other words we present here a case of wrist drop complicating a fracture of the humerus We have endeavored to elicit sensation in the forearm, but we are not able to do so What was the nerve injured The musculospiral—that is, with a drop-wrist and inability to extend the fingers we first think of musculospiral palsy Usually when the musculospiral is caught the ability to supinate remains because the nerve supply of the supinator longus comes off above the point of fracture If we examine further in this particular case however we must conclude that we have more than an injury to the musculospiral nerve with a drop wrist We have an injury to all the brachial cords Why? This man has no sensation that we are able to elicit in the hand and forearm There is complete sensory paralysis until we come to the region supplied by the circumflex Where is our injury—at the site of fracture? No This man must have sustained at the time of the accident an injury to the brachial plexus He was struck by an automobile, so that the injury was in all probability violent and severe What probably happened was that the head of the humerus was temporarily displaced from the glenoid cavity and crushed the cords of the brachial plexus To what extent they are crushed whether they are completely lacerated or whether there is a compression from which he can recover, I think remains to be seen It is about ten weeks since this happened Is ten weeks long enough to be sure that the brachial plexus was lacerated? The fact that the man complains of much pain when the fingers are straightened makes me think that the brachial plexus was not completely cut and suggests that recovery is possible and probable I would not recommend exploratory operation here until two months more of observation without improvement have passed

CASE IV FRACTURE OF FIBULA

Here is a patient in whom we are going to assume something without an x ray picture This patient was injured two weeks ago He came to the hospital yesterday He has had x rays taken the results of which we do not know as yet I will make the diagnosis of fracture of the fibula Many times I have made a diagnosis of a strain in the hip in old people and in a week or ten days gone around and found the buttocks and upper thigh showing this sort of ecchymoses not superficial ecchymoses but deep ecchymoses We rarely see an ecchymosis of this sort present without a fracture so I am willing to assume that this is a fracture I believe this is a fracture and I want to show it because it does show this much ecchymosis I want to say just a word about the superficial bleb that so frequently accompanies fracture I have made this observation that the most marked blebs are in fractures due to indirect violence and that they are more marked when there is extensive overriding of the fragments From this observation I have deduced that the mechanism of bleb production in fractures is as follows The superficial epithelium slides on the deeper skin structures and allows the accumulation of lymph or serum in the space between

CASE V FRACTURE DISLOCATION OF THE ELBOW

This patient shows another uncommon condition that we did not consider in our discussion of the general principles of fractures Here is a fracture-dislocation a fracture into a joint in this case a fracture into the elbow joint This occurred two months ago You will notice that there is a fracture not only of the humerus but of the radius and ulna Notice that in the x ray picture the olecranon is back of its normal position that the olecranon does not rest in the olecranon fossa and that there is therefore a distinct backward dislocation In the face of the extensive disorganization of this joint let me call your attention to the amount of motion which it permits The patient brings it pretty nearly to a right angle and I think in time will get it to a little more than a right angle and is able to extend the joint almost to the normal degree—a functional recovery almost beyond belief in

view of the demonstrable anatomic changes. This brings up the great question of results in fractures.

Results in fractures are of two kinds—functional and anatomic. The anatomic result you estimate from the *x*-ray picture. When I first left the County Hospital as an intern I knew all about fractures. I had had a hospital service with a large number of fractures. I had treated a large number of fractures and was very proud of my results. My self-conceit never has received such a marked shock as it did with the introduction of the *x*-ray apparatus. I gathered up some of my old fractures that I was proud of and took pictures, and when I got through with the first ten or fifteen I almost stopped treating fractures. Yet every one of those fractures had good functional results. In other words, complete restoration of anatomic form is rarely necessary and is usually impossible. If the ends of the bone are in contact for one-third of their diameter, or sometimes even less, and the alignment, particularly in weight-bearing bones, is good, satisfactory functional results are almost certain.

How shall we dress this disorganized joint? In the older text-books there used to be definite rules laid down for the way to put up the various fractures around the elbow-joint, and obviously fractures around the elbow-joint are numerous. Fractures may occur through the humerus, through either one of the condyles, or through both, through the olecranon, and what not. We used to put up some in semiflexion, some in extension, some in pronation, others in supination, and others half-way between pronation and supination. I think it is erroneous in the treatment of fractures around the elbow-joint to follow any of those rules, and I will tell you why. I think even with a good *x*-ray that shows you the extent of the fracture, that you cannot estimate in any way whatever the amount of laceration of the ligaments. I feel you cannot tell accurately what effect the position of the arm in relation to flexion and extension will have on the fragments, whether it will throw them backward or forward. There is but one accurate and definite way of getting at it, and that is to reduce that fracture and to fix that fracture in front of the fluoroscope. I am coming to believe that I cannot

tell in what position I should put the arm to get the best apposition of the fragments without a fluoroscope. The fracture should be reduced before a fluoroscope and it should be put up before a fluoroscope.

Passive motion and massage should be given early in this class of cases. Massage helps the lymphatic circulation and reduces the tendency to fibrosis. Passive motion prevents new adhesions and stretches or breaks those which have already formed. Together, these two measures are of prime importance in preventing ankylosis and preserving the greatest degree of mobility at the joint. Let me again call to your attention the good functional result this patient has in spite of the bad anatomic result.

CASE VI COMPOUND FRACTURE OF FEMUR

This boy has a peculiar injury. He gives a history of having had twelve operations for osteomyelitis of the femur. About seven weeks ago he came into the hospital with a fracture at the site of the old operative wound. There was unquestionably some rarefaction of this bone. This was in a sense a pathologic fracture. This boy had the end of the femur sticking through the skin. It has been reduced but there is still some little malposition. The wound is badly infected and it is a difficult thing to know just how to treat the condition. It is apparent that an open operation will be advisable if we are to obtain the necessary reduction of the fracture. On the other hand it is obvious that one cannot in the presence of this active suppuration go in and try to put the ends of the bone in apposition and fix them by mechanical means. I feel therefore, that the best thing to do is to wait until the suppuration ceases and then to correct any important deformity.

It may not be amiss here to say a word about the treatment of suppurating wounds. The other night Dr. Richter presented his slides before the Chicago Surgical Society and talked about his experience in the war zone. In the treatment of suppurating wounds he tried out a variety of irrigating solutions among them being Dakin's solution a mild iodid solution carbolic acid solu

tion, and plain water From this experience he concluded that it did not matter what solution you used, it did not matter if you did not use any solution, provided you had sufficient drainage Free drainage is the all important principle in the treatment of suppurating wounds Dr Richter described 2 cases for illustration Two men came in on the same day in the same ambulance In one the whole olecranon and lower end of the humerus had been blown off and the joint was wide open In the other a shell fragment had entered the soft tissues, producing a puncture wound The first man was up and about in two or three days with a perfectly healthy wound that healed up promptly The other man grew worse There was wide destruction of bone and wide destruction of the soft tissues, and the man was still in the hospital when Dr Richter left Had this wound been opened widely immediately it would have healed just as kindly as the other did Dr Richter felt that where he left the wounds wide open he always got good results He was also sure that he got bad results where drainage was insufficient, no matter what else was done The last word in the treatment of suppurating wounds is, therefore, drainage, and we are treating this boy accordingly

CASE VII FRACTURE OF FIBULA

This woman fell and hurt herself the day before yesterday The first question that presents here is that of diagnosis An x ray picture has been taken but no report has as yet been made The intern tells me that they believe this to be a fracture of the lower end of the fibula with some injury of the tibia or of the internal lateral ligament, and with some dislocation of the foot toward the fibular side

I present this case for the purpose of bringing out a few general principles concerning the treatment of fractures You will agree with me that a fracture box, even though well padded, is not as soft as a bed would be As that foot rests in the fracture-box, where is the pressure? Over the os calcis Over the heel If there is one complication that men of experience dread in these fractures around the ankle joint more than any other it is the

necrosis that so often occurs over the os calcis. This is one of the best methods of producing necrosis over the os calcis. Now what does that fracture box do? Nothing but furnish a hard board for that soft leg to lie on, nothing else. Does it reduce those fragments? No. Does it help the swelling which appears? No. Does it in any way help to hold those fragments in position? No. There happens to be no pressure necrosis in this case. That padding was put in last night to protect the heel but it will not protect it long. Some day I am going to come over here build a bonfire and burn up all these fracture-boxes if it takes all day to do it. That is the only way we will ever get rid of them. There is one way of making a splint, if you are not lazy and that is to get two boards and a blanket. Roll the blanket on the splints, making a hammock splint. A blanket hammock will not interfere with the circulation of the superficial soft tissues—a most essential point in the treatment of fractures—and will provide quite efficient immobilization.

Now the question comes up. When will you reduce the fracture if a reduction is necessary, and when will you put on a permanent splint? If the deformity is marked and you are sure you are dealing with a fracture around the ankle-joint with more or less dislocation do not wait for the x ray give your patient an anesthetic unless there exists a marked contraindication reduce the dislocation and reduce the fracture as well as you can. Manipulate the fragments into apposition as accurately as you can using the sense of touch as your guide and then put on a molded plaster splint or a molded splint of some other firm material. That splint should never be a circular splint unless it is immediately cut. A circular plaster of Paris cast should never be placed on an acute fracture unless it is cut and spread and should never be placed on the forearm without being split. A metal splint is much better. Never, under any circumstance, attempt to crowd the fragments of a fracture into position with the splint, no matter what kind of a splint it is. Never try to crowd the fragments into position by pressure over the soft parts. So long as a limb is absolutely quiet and is not subjected to the pulls of contracting muscles trunk movements, and so

on, a reduction, once accomplished, tends to persist. The function of a splint is to immobilize, to provide this absolute quiet. When one attempts more than this he is overstepping the limits of usefulness of the splint and making it an instrument of destruction.

CASE VIII. FRACTURE OF THE FEMUR (INTRACAPSULAR)

I just want to show you this case because of the opportunity it gives me to speak of the general question of extension. This man has an intracapsular fracture. I am treating all my fractures of the humerus by extension for the first two weeks until they are solid and I believe that until we have a better method we will have to treat the fractures of the femur by extension. All these fractures should be dressed in the abducted position and some means of preventing internal rotation provided. That can be done very readily by passing a number of strips of adhesive around the thigh and attaching them to a brick which is allowed to hang over the side of the bed. The Bardenheuer extension, I think, interferes too much with the circulation. In any form of extension remember we have to contend with this.

A word about putting on adhesive. I believe adhesive strips should be put on from the knee to the hip and should extend over the fragments, so that when traction is made on the strips, all the muscles and all the fascia from the knee to the hip will be under tension and then the fragments will be pulled into place. Just one other statement. As my experience with the Steinman method of extension increases I am coming to believe that it is the best method so far devised. I do not believe that the old Buck's extension is sufficient to overcome the strong muscles of the femur. By the Steinman method a nail is driven through the os calcis or the lower end of the femur (see Figs 491, 492), and extension is obtained by attaching the familiar weight and pulley device of Buck to it. As my experience increases I am growing more and more fond of this procedure.

CLINIC OF DR. PHILIP H KREUSCHER

MERCY HOSPITAL

HYPERTROPHIC VILLOUS SYNOVITIS OF THE KNEE-JOINT

Summary An infectious disease secondary to infectious processes elsewhere in the body characterized by a relatively acute onset followed by gradual enlargement of the joint associated with moderate but fairly constant pain and increasing disability, pathologic anatomy—bone never involved, differential diagnosis—rheumatoid arthritis, Charcot joint, tuberculosis, sarcoma, treatment

A LESION which frequently is not diagnosed and which is often mistaken and treated for tuberculosis is that which we now know to be a hypertrophic synovitis involving the villi of the knee-joint. I wish to present the histories of three advanced cases of this disease.

CASE I—Patient a male, aged thirty-six, who at the age of thirty noticed a small olive-shaped protrusion in the right popliteal space. This was taken to be a cyst and was removed without much difficulty. About a year later he developed multiple arthritis and synovitis involving the elbows, the right shoulder, and both knees. There was no acute incapacity, but after a long walk he would notice a swelling in both knees lateral to the patellar ligament. This swelling would subside after some hours of rest, but would again appear after the patient took prolonged exercise, such as walking or running. This swelling increased, and the patient, who was a physician, noticed that in place of the fluctuating tumor which was present on either side of the patellar ligament, the masses were becoming boggy and not as painful as previously.

When he presented himself for treatment both knees were markedly swollen; there was comparatively little acute pain,

but always a dull ache and stiffness of the joints after rest. The tuberculin and Wassermann tests were negative. He gave no history of previous throat or sinus infection. He had, however, for quite a number of years had considerable trouble with his teeth. \times Ray examination of the teeth showed ancient abscesses at the roots of several of them and numerous pyorrheal pockets. He had had autogenous vaccines prepared but they were taken with very little benefit. The patient presented himself in Dr. Murphy's clinic in April, 1915. Dr. Murphy performed a complete synovial capsulectomy of the right knee-joint.

In October, 1916, he came into my clinic. His right knee was almost normal in size, freely movable, and painless. The left knee, however, had become quite as large as the right knee was before operation. Upon examination it was found that the condition existed there the same as it had in the right knee. A complete synovial capsulectomy was performed October 14, 1916.

CASE II—A female, aged thirty two, came to the hospital on account of multiple metastatic arthritis involving the fingers, elbows, ankles, and the left knee. A careful clinical history revealed that the patient had had repeated attacks of tonsillitis and infection of the frontal sinuses. Upon examination it was found that the left knee was enlarged, especially laterally and in the popliteal space. The masses did not fluctuate, but had that boggy sensation typical of villous hypertrophy. Aspiration of the joint gave us a very small quantity of serous fluid, but did not reduce the swelling about the knee joint. The \times ray picture showed no bone destruction and no changes in the bone ends. A diagnosis of hypertrophic synovitis was made and the patient was operated on December 22, 1916.

CASE III—A female, aged fifty two, presented herself at the hospital with multiple arthritis originating from infected teeth and involving the right knee joint and the ankle- and elbow joints. The right knee-joint was very much enlarged, but had those typical oval masses protruding from the joint cavity on either side of the patella. On the inner side of the quadriceps tendon a long sausage-shaped mass extended upward a distance of about 3 inches. There was very little acute pain, but a con

stant dull ache and stiffness of the knee joint. This condition had existed for a period of nine months and had entirely incapacitated the patient. The most comfortable position of the limb was that of slight flexion, which accounted for her inability to straighten the knee completely. As in the preceding cases the x ray picture showed no bone involvement. The aspirated fluid was serosanguineous, probably due to the fact that she had been walking a great deal just preceding the aspiration.

The foregoing histories show three types of a well defined condition found in the advanced stages of hypertrophic villous synovitis. In each of them we have a period in the early course of the disease which must be recognized as an acute synovitis. This acute synovitis became chronic with or without enlargement of the joint, and finally we have the late pictures of enlarged joints with large masses protruding from either side of the patella and quadriceps tendon with a rather less prominent patella. One of them had considerable lateral bulging especially on the inner side, while another had a marked protrusion posteriorly into the popliteal space. I have no doubt that the small mass which protruded into the popliteal space in Case I was a protrusion of a portion of the synovial sac rather than a cyst.

All the older writers recognized the fact that cases of villous synovitis were but the late stages of an acute or chronic synovial involvement. They all agreed that loose semilunar cartilages, rice bodies in the knee-joint, genu valgum and pes planus and the so called rheumatoid arthritis were the principal causes of this disease. Even Tubby in his latest work on bones and joints, had not fully grasped the fact that nearly all these cases are of bacterial origin when he said that "the possibility of a septic arthritis of a mild type must not be forgotten."

From our more recent clinical and experimental studies of synovitis and arthritis we find that practically all of them are metastatic from some focus of infection. By a metastatic infection we mean one that is due to organisms which are active and are capable of multiplying within the tissues of the host, and eventually attack similar or susceptible tissues in some distant part of the body. In my recent analysis of nearly 1000 cases of

arthritis and synovitis I found that 25 per cent were due to infected tonsils 18 per cent to infected teeth and alveolar processes 17 per cent were due to infected sinuses and antrums 17 per cent to Neisserian infection and the remaining 23 per cent were caused by infections of the genito urinary tract gall bladder typhoid fever dysentery scarlet fever etc I have under my care at the present time a case of synovitis which developed during the third day of an attack of smallpox and another case upon which I have recently performed an arthroplasty in which the infection in the knee began during the course of an attack of scarlet fever We believe that the foreign bodies and the irritations in the joints due to deformities of the extremities are causative only inasmuch as they traumatize the synovial membrane and make it more susceptible for invasion by pathogenic organisms We believe furthermore that when the knee-joint has in it loose cartilages or other bodies the pathologic changes may be greatly exaggerated because of the irritation of these foreign bodies It is our opinion however that the foreign bodies alone are not primarily causative of the condition under discussion

The pathologic changes which take place in these joints and which distinguish this type from the ordinary chronic synovitis is the overgrowth of the synovial membrane and synovial fringes so that they frequently become elongated pads of tissue or even pedunculated masses (F g 485) Very frequently such a mass becomes detached from its base and forms a type of loose body in the joint These pathologic changes have as their origin first irritation from the invading organisms second the repeated traumatizations which occur during active use of the limb It must be remembered that during the progress of this disease the causative organisms continue their work in the subsynovial spaces where they have been deposited If it were possible to arrest this infection in the early stages I believe the joints would get well in spite of the subsequent mechanical irritation In the course of this trouble all or at least a large portion of the synovial tissue is involved and destroyed so that when one opens the joint you see a large irregular ill defined mass of hyper

trophic villous tissue, as shown in Fig 403. Very rarely is there any normal synovial membrane in these advanced cases. The synovial pouch which extends upward, laterally, and behind the

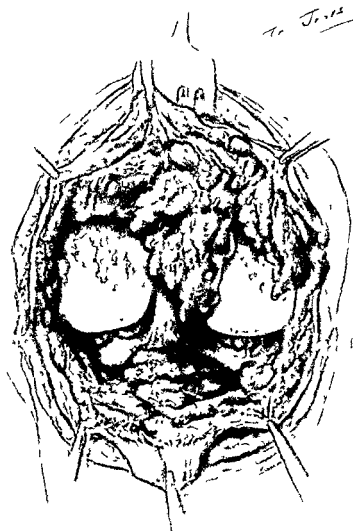


Fig 485—Drawing of interior of flexed knee joint of Case No. III showing the large pads and pedunculated masses of synovial tissue. The articular surface of the tibia is almost entirely covered by villous projections. Note erosion of cartilage on condyles of femur. (Sketch made at operating table.)

patella and quadriceps tendon becomes filled with this villous tissue. The cartilage covering the ends of the bone and the under surface of the patella becomes involved secondarily and probably

only because of the bruising from the pedunculated villi and the loose foreign bodies. The semilunar cartilages which also become involved secondarily may become fragmented and frequently are entirely destroyed as was true in Case III. I have seen the crucial ligaments partially destroyed but have never seen any involvement of the bone.

The symptoms which are present in these cases are very much less severe than one would expect. Very frequently the patient complains only of a burning or a dull ache in the joint the sharp pain being present only after long continued traumatization or when a loose body becomes pinched between the bone ends. The joint feels full and stiff when the patient gets up and about after a period of rest.

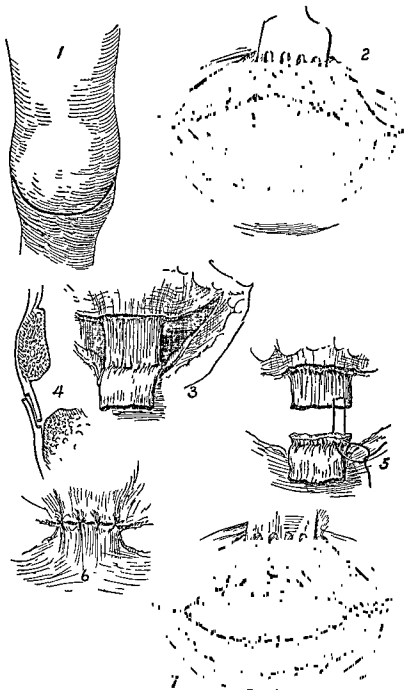
In the diagnosis one must think of the ordinary chronic synovitis rheumatoid arthritis Charcot joint tuberculosis and sarcoma. The cardinal diagnostic points are first the gradually developing enlargement of the joint second the absence of severe acute pain in striking contrast with what one would expect in such an enlarged joint third the presence of the large oval boggy masses which appear on either side of the patella fourth upon pressure downward from above the patellar ballottement which is always present in the simple serous synovitis is absent in these cases fifth aspiration of the joint even with a large needle or trocar yields very little fluid or frequently none at all sixth x-ray examination shows no involvement of the bone which is in striking contrast with the Charcot and tuberculous joints.

The Wassermann and tuberculin tests must always be done. The differentiation from tuberculosis is not very difficult as the synovitis usually occurs in cases where there is a multiple metastatic joint involvement.

In the light of our present knowledge of the etiology and pathologic changes which take place in this type of synovitis the treatment as recommended by the older writers does not seem adequate. How strapping and binding of the joints and mild counterirritation of the skin overlying these joints can benefit the condition is hardly conceivable. Even the injection of strong antiseptics such as formalin in glycerin are of very little benefit except in the very early stage.

The management of this lesion in the early stage involves the removal of the infectious foci which are causative. Infected tonsils must be removed, diseased teeth extracted, and suppurative antrums and sinuses drained. In short, *every possible source of infection must be removed*. That is the first step. The second important part of the management is absolute rest of the limb. A Buck's extension with sufficient weight to overcome the intra-articular pressure must be applied. Hot Epsom salts fomentations when continued over a sufficiently long period of time will relieve the local edema and hydrops. In this early stage the injection of formalin and glycerin solution is beneficial. The administration of bacterial vaccines made from the organisms which are causative of this lesion must be administered, but it is necessary to give sufficiently large doses to get a good constitutional reaction. The above outlined procedure must be continued for months rather than weeks if we desire to give our patient real benefit. If he presents himself for treatment in the advanced stage with all the cardinal signs and symptoms, then there is only one course to follow, namely, complete synovial capsulectomy.

The preparation of the operative field for such an operation is exactly the same as for an arthroplasty. The skin is shaved and treated copiously with alcohol and ether the day before the operation. Just preceding the operation the skin is again cleansed thoroughly with alcohol and ether. The application about the thigh of an efficacious tourniquet is quite necessary, as in this way we can work in a comparatively bloodless field. The operation throughout is performed without hand contacting. *Every effort must be made to avoid infection, as infection following such a procedure where all the tissues are bare and all the coffer-damming has been removed, would be disastrous to the joint if not fatal to the patient.* The U-shaped incision, as shown in Fig. 486, 1, is made through the skin and fat down to the fibrous capsule of the joint. The skin is retracted and dissected upward for about $1\frac{1}{2}$ inches. A second U-shaped incision is then made about $\frac{3}{4}$ inch above the skin incision (Fig. 486, 2). This divides the fibrous capsule and opens the joint. By making the incisions



Tom Jones —

this way we do not have them both lying on the same plane, and we have an obvious advantage over the older methods. The ligamentum patellæ is divided as shown in Fig 486, 3 and 4, first cutting transversely across the ligament and half-way through it, then stripping down the fibers longitudinally for about $\frac{3}{4}$ inch, and finally cutting the posterior half of the ligamentum patellæ transversely. This gives us an overlying flap in the reunion of the ligamentum patellæ and gives us an early firm union. This procedure has a decided advantage in that the patella itself is not divided. Now, the patella together with the entire fibrous capsule, in fact, the entire U-shaped flap, is retracted upward, and we have a complete exposure of the entire joint, as shown in Fig 485. The knee is fully flexed and a resection is made of all the villous tissue, removing the entire synovial capsule if necessary. All the diseased tissue underneath the patella and in the pouches extending upward lateral to the quadriceps tendon must also be removed. If the semilunar cartilages are fragmented or loosened or in any way diseased, they too are taken out. In Case III the semilunar cartilages had been totally destroyed by the disease. After having removed all this tissue, and after seeing the erosion of the cartilage covering the surface of the bone, one cannot conceive of anything but an ultimate ankylosis. On the contrary, all these joints have been movable and serviceably sound without the interposition of a flap. An important point in the procedure is to bring about complete hemostasis after the tourniquet has been removed. If this is not done, we frequently have the formation of a large hematoma in the knee-joint, which always retards healing and which may prove disastrous if it becomes infected. A large hematoma under ten-

Fig 486—1, Line of skin incision. Note enlargement of joint. 2, Retraction of skin and fat. Note line of incision through fibrous capsule, this incision lies about $\frac{3}{4}$ inch above the level of skin incision. 3, Incision through capsule and one-half of ligamentum patellæ. The longitudinal fibers in the anterior half of the patellar ligament have been stripped down to point where posterior half of ligament is about to be divided (author's method). 4, Semidiagrammatic representation of lateral view of patellar ligament after division. 5 and 6, Repair of ligamentum patellæ, method of application of first mattress-suture and appearance after repair is completed. 7, Complete closure of fibrous capsule.

sion may cause considerable temperature without itself being at all infectious I have seen temperatures of 104° to 105° F due entirely to hematoma The temperature subsides after aspiration

The patellar tendon is reunited, the fibrous capsule closed and the skin flap sutured without drainage The patient is placed in bed with the limb in a straight wire cage and with an extension of from 12 to 15 pounds Active manipulation must not be undertaken until after three and a half or four weeks This permits sufficient time to elapse for the patellar tendon *to reunite firmly and for the fibrous capsule to become organized* Active and passive motion together with massage are advantageous and necessary to re-establish the flexion in such a joint

The patient whose history was cited under Case I is a practicing physician, walks without crutch or cane and a month ago, when I last saw him walked without any pain or limp and could flex both knees to a right angle with the thigh Case II has a 45 degree flexion can make complete extension and puts the full weight on her limb without pain Case III was operated on about eight weeks ago and is just now permitted to put some weight on the knee

CLINIC OF DR. FREDERICK G. DYAS

COOK COUNTY HOSPITAL

TREATMENT OF CARCINOMA OF TONGUE WITH RADIUM

Summary Method of application, clinical course of case during treatment, necessity for surgical removal of cervical lymph nodes, coincidence of acid reaction of buccal secretions and oral cancer, advantages of radium therapy.

THIS patient is fifty three years of age, a bachelor, and by occupation a newspaper editor. One year ago he noticed a slight swelling on the under surface of the left side of the tongue opposite the first molar tooth which was carious. He paid no attention to the swelling for six months, at the end of which time it began to increase in size. One month later he consulted a physician who made a diagnosis of epithelioma of the tongue (Fig. 487). The physician told him that he might have his choice between excision of one half of the tongue or treatment by radium. The patient was referred to me with this statement from his physician. I strongly advocated the radium treatment and also had the carious tooth at the site of the lesion extracted.

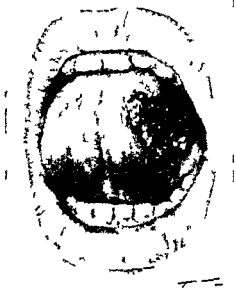


Fig. 487—Carcinoma of under surface of left side of tongue before treatment. The radium needles were buried in the lesion, thus producing the so-called cross fire.

On May 18 1917 two hollow gold needles each containing 35 mg of radium were buried in the lesion of the tongue and allowed to remain six hours. At the same time the cervical glands upon the same side were exposed to intensive radium application for six hours and upon the following day for eight hours. The needles were secured in the tongue by heavy linen threads passed through the eyes of the needles.

The patient complained of no pain after the needles were inserted. He was allowed to go home after the treatment and returned one week later. At that time there was very evident shrinking of the epithelioma which had ceased to bleed and which was losing its cauliflower like appearance. Two weeks from the first application the needles were again inserted in the lesion for the same length of time as previously and the same exposure was given to the cervical glands. One week later the patient presented himself with the epithelioma fast disappearing it at that time being less than one fourth of its original size but there were two palpable cervical glands. The intense exposure to radium had caused a slight burn of the skin of the neck. Notwithstanding this there had been no diminution in the size of the cervical glands while in the tongue where the radium had been buried in the lesion itself there was a most marked improvement. Radical removal of the cervical glands was advised and accepted by the patient.

This was done by the Fenger method making the incision from the tip of the mastoid process of the temporal bone downward along the posterior border of the sternomastoid muscle to the sternoclavicular articulation. This incision went through the skin and the platysma. The dissection was carried from below upward between the sternal and clavicular heads of the sternomastoid muscle. The spinal accessory nerve was identified at the point from which it emerges from the middle of the posterior border of the sternomastoid muscle and was carefully preserved. The jugular vein was exposed throughout its entire extent and a number of glands were found adherent to it. These were removed by careful dissection and both the anterior and posterior triangles of the neck entirely cleared of fat and

glands. The incision was closed by a running catgut suture for the fascia and platysma and a black wax silk continuous suture for the skin. No drain was inserted.

The wound healed kindly in spite of the radium burn, much to my surprise. The patient is to have one more insertion of the radium in the tongue, which I believe will entirely clear up the small area which is left.

In this connection I would like to mention the law formulated by Dr. Charles Mayo and published in the Mayo Clinics for 1915, Volume I, to the effect that in malignant lesions of the oral cavity the normal alkaline reaction is always found to be changed to acid. This acid reaction seems to precede the development of carcinoma. Infections of the oral cavity, such as pyorrhea alveolaris, osteomyelitis of the maxillæ, chronic tonsillitis, tertiary specific lesions, and general unhygienic conditions of the oral cavity tend to produce an acid medium. In corroboration of his statement Dr. Mayo cites the instance of carcinoma throughout the gastro-intestinal tract, pointing out the frequency of malignancy within the oral cavity. It is comparatively rare through the esophagus and it is a common occurrence in the stomach, which is acid, and its maximum occurrence is at the point of the stomach which is most highly acid, namely, the pylorus. Passing on into the duodenum and small bowel the incidence of carcinoma is relatively very rare until the lower portion of the large bowel is encountered, when carcinoma again increases in frequency. It is relatively common in the rectum. So far as the literature gives us any information, the incidence of an acid medium in other locations of malignancy has not been worked out. The point for us to remember, however, is the necessity of impressing upon our patients the danger of allowing infections of the oral cavity to go without proper management and to institute care of the hygiene of the mouth in every particular.

It may be argued that one successful case of the treatment of carcinoma of the tongue by radium is a small argument in favor of the continuation of this treatment. However, when the safety and comfort of this procedure are contrasted with the mutilating

and ineffective resection of one half of the tongue, as formerly practised, it seems to me that every surgeon should give the radium treatment a thorough trial before resorting to the tongue resection. It seems possible in most early surface epitheliomata to bring about a cure of the lesion by the implantation of radium. Whether or not this will control the metastases depends upon the date at which the radium treatment has been instituted. However, in the case of the mouth even though the patient cannot be fully cured, he will have preserved to him a clean painless tongue which will enable him to eat and talk for a considerable period without distress. The advantages of this method of treatment I think are sufficiently clear to justify its adoption in the treatment of every case of carcinoma of the tongue.

OLD FRACTURE OF PATELLA

Summary History—fracture resulting from a fall, repair and refracture after three months on attempted passive motion, examination disclosing wide separation of fragments, technic—lengthening the quadriceps tendon, post-operative management

THIS case represents some of the difficulties encountered in the repair of old fractures the fragments of which have become separated by contracture of the muscles during a considerable period of time

In June, 1916, this patient fell, sustaining a transverse fracture of his left patella, dividing the bone so that three-fourths of the patella was included in the large upper fragment and one-fourth in the small lower fragment. He was operated on in June, 1916, and the patella was sutured with aluminum-bronze wire and the leg put up in extension by means of a plaster cast. The patient was kept in bed for three months, at the expiration of which time he apparently had union of the fragments and was able to walk with the aid of crutches. Later he was able to walk with the aid of a cane, but motion in the knee-joint was limited. In November, 1916, an attempt was made to break up the adhesions under anesthesia, and the patella was refractured, apparently in the old situation. Since that time he has been able to get around with the aid of a cane and a long bandage of elastic webbing applied to the knee-joint as a figure-of-8 bandage.

Examination on March 6, 1917, that is, day before yesterday, showed a separation of the fragments of about 3 inches. There was no evidence of active inflammation. The patellar fragments were freely movable, but the upper fragment could not be brought down nearer than 3 inches from the lower fragment. *x-Ray* examination confirmed the above findings and showed the remnants of the wire which had been used in the operation.

(Operation March 8th under ether anesthesia.) The patella

was exposed through the old incision. An enormous amount of dense connective tissue was found and fragments of wire were removed. The two fragments of bone were freed as well as possible from the surrounding scar tissue and an attempt to approximate the large upper fragment to the lower showed that a distance of 3 inches would have to be bridged over. In order to overcome this difficulty a longitudinal incision was made extending up the thigh for about two thirds of its length. The quadriceps extensor tendon was exposed and separated by a long V shaped incision through the whole thickness of the tendon. This allowed the upper fragment to be brought down to within $\frac{1}{2}$ inch of the lower fragment. We now observed that there were dense connective-tissue adhesions upon the under surface of the patella binding it to the subjacent bone. Upon freeing these it was possible to bring the fragments together without tension.

The fractured surfaces were now freshened and the fragments held in apposition by means of two strong kangaroo tendon sutures inserted in the form of mattress sutures from below upward through the periosteum and fibrous capsule of the patella. Other kangaroo tendon sutures were introduced in a similar manner coming through the quadriceps extensor encircling the two fragments and emerging through the ligamentum patellæ one being introduced from the outer side and one from the inner side as purse-string sutures. Finally another kangaroo tendon suture was introduced after the manner of Stimson in the middle of the ligamentum patellæ through the capsule of the joint and then to the uppermost portion of the upper border of the patella returning in the form of a mattress suture. The edges of the capsule were now sutured together and the quadriceps extensor tendon repaired by uniting the V shaped flap to the edges of the tendon which remained after the tenotomy. It would be possible to obtain further coaptation of the flaps without making any tension on the patellar sutures and therein lies the vital consideration in the repair of fractured patellæ namely *the accurate coaptation of the freshened fractured surfaces without tension*.

After controlling hemorrhage and making the usual skin closure a plaster cast was applied reaching from the perineum to

the toes, with the foot at right angles to the leg and the leg in extension.

The following day the middle two-thirds of the cast was cut out in a longitudinal direction in order to prevent constriction of the blood-supply and to allow inspection of the wound. There was no oozing of blood, but there was considerable swelling of the limb as the result of the trauma. This subsided after four or five days and the wound healed by primary intention.

At the end of eight weeks the cast was removed and daily massage and passive motion instituted. There was firm union of the patella and about one-fourth the normal range of motion of the knee-joint. This was increased under the treatment of massage and passive motion, and the patient left for his home with instructions to carry out this treatment.

In effecting the mobilization of joints, the site of fibrous ankylosis following fracture, it is better to bring about motion by long-continued massage and passive motion than by a single forcible attempt to mobilize under an anesthetic. The method of elongating the quadriceps tendon is not original and may be found in certain works on surgical technic.

CLINIC OF DR. DANIEL N. EISENDRATH

COOK COUNTY HOSPITAL

GUNSHOT WOUNDS OF THE FEMUR

Summary Case I—A compound, comminuted fracture of the lower end of the femur involving the knee-joint, conservative treatment with immobilization and extension the rule unless local or general signs of infection appear, indications for radical measures, experience of Groves and others in European military hospitals

Case II—A lesion similar to that in Case I in a patient with delirium tremens, result—mal union with overriding and angularity which will require operative correction at a later date, injection of antitetanic serum a desirable prophylactic measure in every case of gunshot wound

CASE I—This patient was admitted to the hospital five weeks ago, having been shot through the left femur by robbers. Examination shortly after admission showed a wound of entrance upon the outer aspect of the left thigh about 2 inches above the knee and a projection of the skin upon the inner aspect of the thigh, almost transversely across from the wound of entrance. This projection of the skin was due to the bullet, which was removed, shortly after the patient entered the hospital, under local anesthesia. The knee-joint, in general, showed considerable swelling, especially in the region of the suprapatellar bursa. The radiograph (Fig 488), taken in an anteroposterior direction, showed an oblique fracture located at the junction of the lower and middle thirds of the left femur, with but slight lateral displacement of the fragments. The lateral view (Fig 489) showed that the fracture was V shaped, with the upper fragment wedged in between the two large lateral fragments. In other words, we were dealing with a compound comminuted fracture of the lower end of the femur, the bullet having also passed through the knee-joint, as shown by an extensive swelling of the joint.

Measurement of the two limbs showed a shortening on the left (the injured) side of $1\frac{1}{4}$ inches

Conservative treatment was decided upon after the removal of the bullet, and an aseptic dressing was placed over the wounds

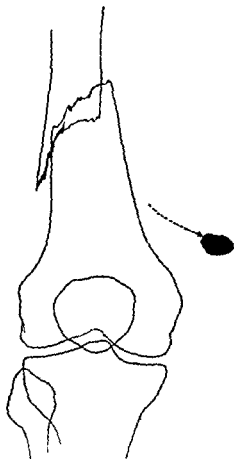


Fig 488 —Tracing from x ray plate of Case I, described in the text Note position of bullet, well away from the bone (anteroposterior view)

of entrance and exit (the latter where the bullet was removed), and an extension of 20 pounds was applied to the thigh, the knee being flexed almost at right angles and placed upon a double inclined plane splint made of $\frac{1}{4}$ inch iron tubing, as shown in Fig 490 As a prophylactic measure 1500 units of tetanus

antitoxin were given upon the day of admission to the hospital. No attempt was made to disinfect the vicinity of the wounds by any means other than that of painting the skin with pure tincture of iodine for a distance of 4 inches from each wound

The patient's temperature has never risen much above normal during the past five weeks, and, as you will see by this ex-

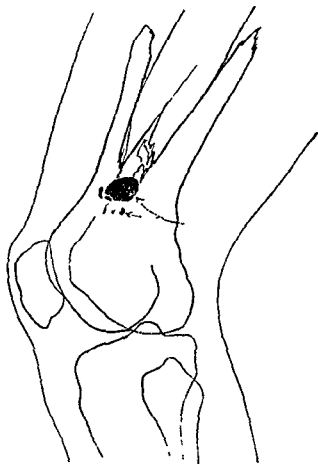


Fig 489—Tracing from x ray plate of Case I, same lesion as shown in Fig 488 (lateral view)

amination, the result obtained is an endorsement of the conservative treatment which we have employed. Recent literature is full of references to the treatment of gunshot fractures of the long bones, and the general opinion is well summarized in a recent article by Groves,¹ who believes in immobilization in a

¹ Brit Jour Sur, 1916, 3, 592

appear. Fragments of bone should not be removed unless they are dead.

The best position for the limb is with the knee at an angle of 120 degrees and the hip flexed. A femur which requires 25 pounds in a straight position only needs 15 pounds when the knee and hip are flexed. Adhesive plaster should be applied to the thigh unless the wound be so extensive that this cannot be done. The transfixion of the femoral condyles or at least the application of some method of extension, as first suggested by Steinman, and modified by Groves (Fig 491), gives the best results where adhesive plaster cannot be applied for extension.

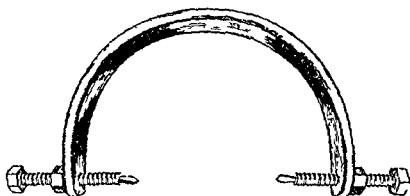


Fig 491 —Groves' horseshoe clamp for use as a substitute for the Steinman pin. The clamp can be applied either to the condyles of the femur or to the head of the tibia. See text and Fig 492 for description and illustration of the method of application.

This method is not without its dangers, as Groves in the article just quoted points out. In 2 out of 6 cases in which the Steinman pins had been used the pinholes became septic and there was also suppuration in the knee joint, which Groves thinks may have been due to the pins. This may be avoided either by waiting until the infection is overcome before the Steinman extension is applied or by using the head of the tibia, where no soft parts except the skin and fascia are involved. Sixteen pounds' traction does not do damage to the ligaments of the knee joint. Movements of the muscles and joints, after the danger of wound infection has ceased and the leg is in good position in its sling should be carried out daily, so that when the

bone is firmly united the patient will be able to work. In the majority of cases the Steinman extension is applied within three days after the admission of the patient except where severe infection is present. Sixteen pounds is usually enough, and may be reduced by one-third in two weeks, the extension altogether being kept up for six weeks. If the infection tends to travel upward along the thigh, a special straight splint can be used. Groves' results have been most encouraging. He emphasized particularly the conclusion that ragged shell wounds with re-

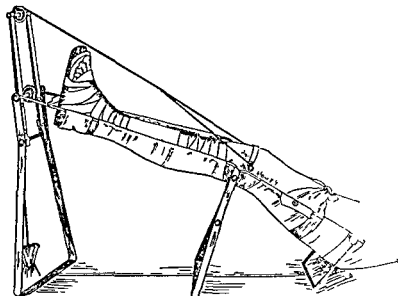


Fig 492 —Extension by transfixion or horseshoe screw clamp, the leg being supported on the wire cradle splint of Groves

tained missiles must be opened early and freely, but that clean perforating wounds, as in the case I am showing you today, should be left alone. Between these two classes are a large number of cases in which the local evidences of infection and general symptoms, such as fever, leukocytosis, etc., are indications for immediate operation.

Of 32 clean cases treated by Groves, only 2 did not give satisfactory results. Out of a total of 60 cases, 6 died—10 per cent. There was loss of the limb in 66 per cent, good form and

condition in the limb saved in 74 per cent.; delayed union in 16 per cent.; delayed healing in 6 per cent., and a limp in 4 per cent. Some of his conclusions are of great value in giving us a fairly good picture of the experiences gained in the treatment of gunshot wounds of the femur during the present war. These are as follows:

The limb should be immobilized at the earliest possible moment, and this immobilization should not interfere with frequent dressing. Immobilization is best carried out by a wire cradle sling splint (Fig. 492) constructed on the principle of the double inclined splint. When the wounds have been thoroughly opened and drained and have taken on a healthy character, the Steinman transfixion and extension treatment should be applied and maintained until union is firm. This is far more reliable than the use of adhesive plaster, but is attended by certain risks of septic infection of the soft tissues and particularly of the knee-joint, which I have referred to above. The comminution, apart from sepsis, is not a hindrance, but rather a stimulation to rapid union. The removal of pieces of comminuted bone is unwarranted and is a most potent cause of non-union. The position of flexion of the thigh involves the risk of pus being tracked up the limb, but this can be prevented by thoroughly opening the infected area, or if not, drainage must be kept up by the use of a splint which keeps the limb horizontal. I can most warmly recommend the articles by Groves, Bowlby, and Martin in the October, 1916, number of the *British Journal of Surgery*, and also the monograph by Groves on "Modern Methods of Treating Fractures," by William Wood & Co., 1916, to those interested in this subject.

CASE II.—The second case is one of penetrating gunshot wound of the lower end of the femur quite similar to our first case, and is another example of bullet wounds of the extremities as we meet them in civil practice.

The first thing to consider in every case of gunshot wound, as I have previously explained, is the wound. If it is a penetrating wound, there is usually very little danger of infection, and the treatment of the fracture can be undertaken at a much

earlier period, but if there is extensive destruction of the soft parts or the patient is not seen until the end of forty eight hours, and there is extensive infection of the soft tissues in the vicinity of the point of fracture the whole problem is one of combating the infection, and we are compelled to postpone active treatment of the fracture until the infection has been controlled

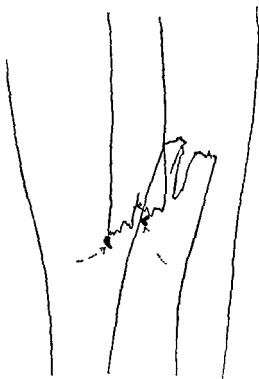


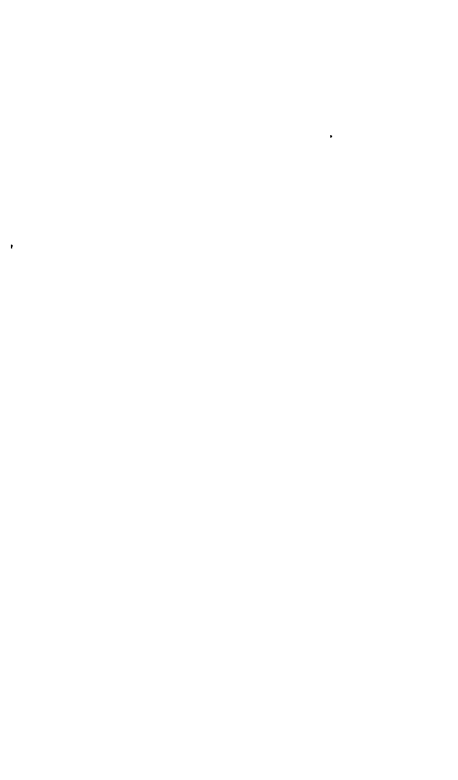
Fig 493 —Tracing from x ray plate of Case II showing degree of angulation and overriding at point of fracture Arrows indicate particles of lead from the bullet

Our second patient has had delirium tremens and this has interfered greatly with the treatment of the gunshot fracture as it would ordinarily be carried out The x ray (Fig 493) shows that the bullet has divided the lower end of the femur almost transversely It was impossible to apply extension on account of this patient's condition so that there has been malunion

(Fig. 493) at the point of fracture, with considerable overriding and angularity, which will require special treatment. It is too late for the application of the Steinman extension, and the only method of treatment which can be considered is that of operative correction of the malunion which must be done in the near future.

In considering the first case I can heartily recommend the position taken by Groves favoring extension in the majority of cases of fracture of the femur either by adhesive plaster or by the Steinman method of using pins, ice-tongs, etc. With the knee and thigh in a flexed position, the tendency for the powerful gastrocnemius muscle to pull the lower fragment downward and backward, so that it may impinge upon the vessels and cause thrombosis with resulting gangrene of the limb, is corrected.

One thing I would like to emphasize is, that in every case of gunshot wound it is best, as a matter of prophylaxis, to give a dose of antitetanic serum.



CLINIC OF DR KELLOGG SPEED

COOK COUNTY HOSPITAL

RIGHT UPPER QUADRANT APPENDICITIS

Summary Fetal development rotation and descent of colon usual position of cecum and appendix abnormal positions especially right upper quadrant locations symptoms of right upper quadrant appendicitis diagnosis direct and differential observations on operative pathology in 3 cases

WE must turn our attention today to the ten week-old human embryo At this period the cecum the part we are most interested in because of its relation to the appendix lies close to the umbilicus The small intestine occupies the right side of the abdominal cavity and the liver is so large that it reaches nearly to the pelvic brim The colon and the small intestine cannot be differentiated in size, all the intestine has a common mesentery attaching it to the spine Somewhat later the stomach, cecum and small intestine develop and differentiate, and the intestine becomes fixed at its two extremities one near the diaphragm and the other in the pelvis and it elongates with the cecum budding out near the pelvis beneath the liver As the colon elongates it forms a curve with a convexity near the cardiac end of the stomach and a slow differentiation into descending and transverse colon with a splenic flexure ensues After the fourth fetal month the widely open umbilicus closes, the cecum moves inside the abdomen The liver blocks its ascent, and yet its attachment to the small bowel determines that it shall pass around to the right and come to lie just caudal to the liver The picture of the colon at this time shows the cecum near the large liver, high in the abdomen extending ventral to the duodenum to form transverse and then descending colon into the sigmoid After the fourth fetal month the portion of the cecal colon with

the attached small bowel moves downward on the right side of the expanding abdominal cavity to form the ascending colon (Fig. 494)

Let us then consider the various positions occupied by the cecum as follows:

- (1) Outside the abdomen
- (2) Within the abdomen close to the umbilicus, low because of the large liver and short mesocolon
- (3) Ascending near cardiac end of the stomach, pushed by mass of small intestine on right side of abdomen.

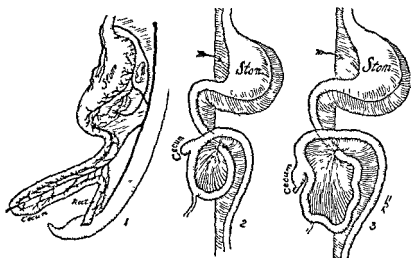


Fig 494 —1 Early fetal development of alimentary tract before there is much differentiation 2 Budding of stomach and cecum, with beginning rotation of each 3 Further fetal development Stomach well formed Cecum distinct, lying in upper right quadrant prior to descent

- (4) Rotation beneath the liver into the right side of abdomen.
- (5) Descent into right iliac fossa

The usual position of the cecum and its vermiform appendix is in the right cecal fossa below the pelvic brim We are conscious of its full descent in the adult; in infants we expect the local findings of appendicitis to be higher—near the umbilical level—and for the most part our incisions for exposure of the appendix in infants are made at a higher level than in adults

If the expected rotation of colon and cecum about the long axis does not occur, we may find the posterior longitudinal band in front or turned to one side; but if the cecum, before becoming fixed, has rotated without full descent, it is found in the right hypochondrium or even epigastrium, corresponding to the early fetal position. Consequently, the appendix then occupies a site in relation to the liver, kidney, gall-bladder, stomach and duodenum, and may involve them in any pathologic disturbance.

At this time we are especially interested in right upper quadrant appendicitis (I do not mention left-sided appendicitis with transpositions of viscera, etc.), and our inquiry into fetal development has been to demonstrate how, as the result of some interruption in the natural course of its migration, the appendix may lie high on the right side. We must allow, however, that in addition to *non-descent* other influences may be acting. The cecum may be congenitally short, it may fail to seek a normal level because of a short and fixed mesocolon. Early inflammation may cause its adherence to kidney or liver, or an agglutinative localized peritonitis may plaster it to the duodenum or gall-bladder and cause failure to descend. Moreover, we must consider that an extremely movable cecum with a long, well-fashioned mesocolon may permit a wandering upward of the colon after a normal descent as the result of pathologic processes in neighboring organs, or urged by the pull of peri-appendiceal adhesions high in the abdomen.

The symptoms of right upper quadrant appendicitis do not differ from the classical symptoms produced by inflammation of the *normally placed organ*. An onset with pain of acute or colicky character, nausea and vomiting, abdominal rigidity, fever, and the leukocytic rise are generally all found. A difference in location, however, makes the physical examination uncertain and puzzling. Early in an attack the pain is near the liver or duodenum, the vomiting usually comes on much quicker, the localized tenderness is high in the gastric region, and because of proximity to the more rapidly absorbing diaphragmatic area we may expect a sharper rise in the white blood count. These points are, of course, governed by the general pathologic con-

ditions surrounding the organ its previous inflammation or its early rupture, just as in iliac fossa attacks

To make a differential diagnosis is more difficult than to differentiate between right sided acute salpingitis and appendicitis in women. One has not the physical signs to be elicited by vaginal

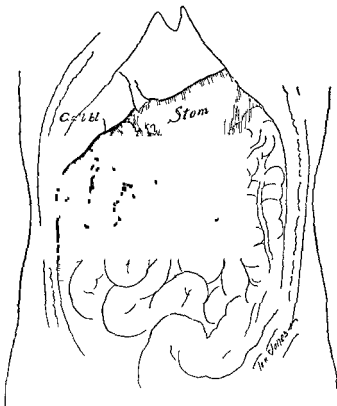


Fig 495—Appendix in right upper abdominal quadrant. Cecum rotated but undescended. Appendix lying superficially its inflammation simulating gall bladder disease

examination or the history of venereal infection for guidance. On account of the location most cases are mistaken for acute gall bladder infection, perforated duodenal or gastric ulcer, stone in the ureter with infected kidney, acute perirenal abscess, and disturbance of the pancreas. Customary points in the history must be diligently examined. Absence of previous stomach

disturbance, of gall-bladder pain or previous typhoid or intestinal infection must be ascertained, and a careful urine examination for blood, pus and sugar must be made. Kidney percussion,

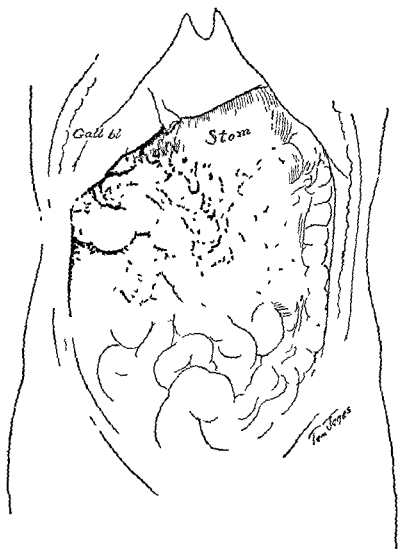


Fig 496—Undescended cecum, unrotated so that the appendix lies posteriorly. In this position it may be adherent to perineal or gall structures and confuse diagnosis with disease of these organs.

tenderness, and pancreatic enlargement or other evidence involving the differential diagnosis of upper right abdominal lesions must be considered (Figs 495, 496).

These unusually located appendiceal attacks have long been

recognized Turner reported a case in 1863 where the appendix lay very high with no adhesions about it in a position undoubtedly of congenital origin¹ In 1869 Fagge² noted a similar instance When the abdomen was opened he found the cecum distended and fairly free high in the right abdomen but it could not be placed in its natural position because that was occupied by other bowel Mott in 1889³ recorded an instance of a 7 inch appendix which was turned up behind a high lying cecum and mesocolon then crossed the second part of the duodenum and was attached to the front of the right kidney by its tip Curschmann cites an instance⁴ of a difficult diagnosis in a high lying appendix and mentions two other patients in whom the organ lay behind and under the liver Within the last year I have encountered 3 cases of right upper quadrant appendicitis and for that reason consider the anomaly worthy of attention All three were in men The first patient had a typical pain vomiting fever attack with symptoms localized just under the liver There was a leukocytosis of 12 000 the right iliac fossa was entirely negative We thought we could exclude kidney and gall bladder lesions by history and laboratory examination and physical findings and make a diagnosis of perforating duodenal ulcer At operation I was amazed to find a fresh and fairly well walled-off abscess just below and caudal to a normal gall bladder at the bottom of which lay the offending appendix attached to the cecum not 2 inches from the liver In the second patient the findings were not so acute because he was not seen until the attack of pain and rigidity began to wear off and the trouble was considered to be in the gall bladder Again we were surprised to find a similar high lying cecum with a thick gangrenous appendix lying rather superficially beneath the abdominal wall glued to the inferior margin of the gall bladder About a month after the second case I encountered a third in an adolescent youth This time

¹ Edinburgh Med Jour 1863 110

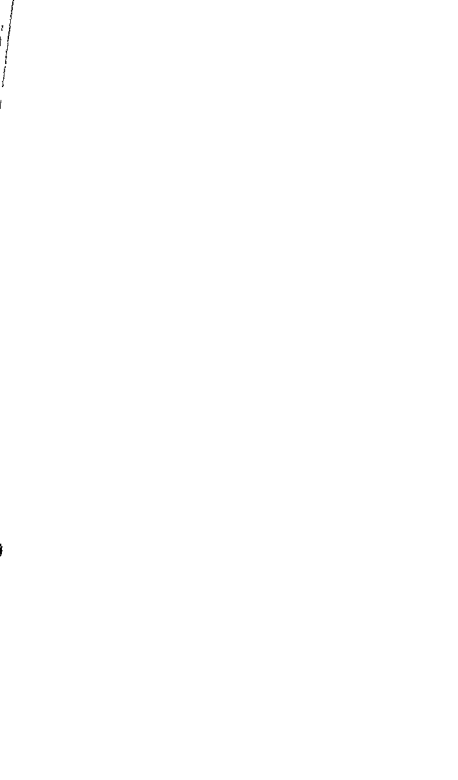
² Guy's Hosp Reports XIV 343 Case 55

³ Trans Path Soc London 40-106

⁴ Deut Archiv f Klin Med 1894 53

we had more wisdom and, although there was blood in the urine, and the local findings were again high on the right side with an absence of tenderness in the right iliac fossa, the onset and symptoms seemed much like an acute appendicitis and we were not surprised by the findings at laparotomy. Operation disclosed a rather slender appendix 5 inches long deep down in the right flank, its tip over the right kidney surrounded by a plastic exudate but not perforated. It took origin from the cecum at a point about 4 inches from the liver margin well toward the back and, although I could feel and see this point I could do no more than tie off the organ and remove it no burial of the stump being possible. In this instance I felt that the cecum had only partly rotated and had made little if any descent.

We must recall then that acute inflammatory attacks in the right upper quadrant may be caused by the appendix and our differential diagnosis must include appendicitis.



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